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JOURNAL OF ELECTRICITY

VOL. XXXIX NO. 9 SAN FRANCISCO, NOVEMBER 1, 1917 PER COPY, 25 CENTS

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JOURNAL OF ELECTRICITY

Devoted to the Generation, Distribution and Utilization of Energy

VOLUME XXXIX SAN FRANCISCO, NOVEMBER 1, 1917 NUMBER 9

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THE CALL TO SERVICE

There are two courses open to a man—to die for his country or so to live for it that his country will be worth dying for. And either task calls for an ideal of service steadfastly held in view above all selfish interests.

An Appeal to Men of the Electrical Industry

From the president of a great university in the West who a few months back wrote, "I am very much honored and pleased to be given the place of honor by the Journal of Electricity" to the beautiful resolutions recently unanimously passed by a great gathering of men of the industry "expressing appreciation and gratitude to the publication known as the Journal of Electricity for its very excellent co-operation and interest manifested," there continue to come into the editorial and managerial departments of the Journal of Electricity verbal and written expressions of whole hearted commendation for its work. With the idea of steady improvement in mind, the Journal is constantly endeavoring to meet new problems as they arise. With this issue several changes have been initiated. There will be further changes in the future that these pages may continue to meet the needs of the contractor-dealer, of the jobber, the central station and the engineer. The one excuse for journalism is the service which it may perform. In the encouragement of all that is progressive, with the idea of better business in mind but above that, a better nation and a better co-operation between nations, the Journal has given its service as best it saw it for the upbuilding of the electrical industry in the West. It hopes to make that service greater. Elsewhere in these pages announcement is made concerning a subscription campaign that offers a beautiful automobile, a handsome grafonola and numerous cash prizes to those that will assist in this great work throughout the West.

Men of the electrical industry—the Journal of Electricity has proven its worth by thirty years of active service. In the prime of its splendid manhood, it now reaches forward to take its place in affairs electrical in the councils of the nation. Your whole-souled co-operation is most earnestly solicited.

Armed Protection for Power Plants

One of the surprising incidents of America's entrance into the present world war is the rapidity with which governmental authorities saw to it that the great hydroelectric plants of the West were amply protected by armed guards under military control.

Recent withdrawal of these governmental troops and the substitution of civilian guards has, however, caused considerable anxiety and much adverse criticism on the part of those having the industrial power supply responsibilities at heart in the great West.

A glaring example of the inadvisability of this move is to be found in the region that supplies electric power for the operation of mines in the great Coeur d'Alene district of the Northwest.

The Washington Water Power Company furnishes the power for the major portion of this district which produces over one-third of the entire lead output of the United States and a very large proportion of the zinc, two metals widely used in munition manufacture. As a consequence, in the uninterrupted operation of these mines, the Government has a vital interest.

It is interesting to note the action which the Canadian Government has consistently taken since the beginning of the war in 1914 in regard to the protection of its hydroelectric plants. For instance at the plant of the West Kootenai Light and Power Company at Bonnington Falls, just across the border to the north of Spokane, the Canadians have an armed force of forty-two soldiers guarding the one power plant at that place, which furnishes power for a num-

ber of copper mines and also for the smelter at Trail.

Immediately to the south of this Canadian installation, the great Washington Water Power Company furnishes power for the large lead and zinc mines of the Coeur d'Alenes, including the Bunker Hill and Sullivan smelter at Kellogg, Idaho, and yet with this nation's tremendous resources the government seemingly does not take the same precautions as do our Canadian allies to the north with their much more limited means.

It is realized that a gigantic task now confronts those having the protection of the nation's industries in charge and as a consequence this editorial is offered only in the spirit of constructive criticism and it is believed that a careful review of the matters herein called to the attention of these governmental authorities will receive immediate and thoughtful attention.

Accident Prevention

In the issue of the Journal of Electricity for October 1, 1917, attention was called to the overdoing of accident prevention in the West. On another page of this issue appears a very able communication from the electrical engineer of the California Industrial Accident Commission defending the work of that commission.

The Journal of Electricity would feel remiss in its duty did it pass by this discussion without calling the attention of its readers to the very excellent work that has been done and is being done by this group of public spirited men. Their work merits the support of all upbuilders of the electrical industry throughout the West.

The fact remains however that general rules are often found burdensome in special application. A forceful illustration of this is to be found in the published rules for overhead crossings by the U. S. Bureau of Standards. In the West, due to the sparsely settled condition of the country and due to the unique engineering problems encountered there, these rules have proven wholly inapplicable. As a consequence the Pacific Coast Section of the National Electric Association has undertaken to advise with the California Railroad Commission on drawing up rules that are particularly adaptable to the conditions that prevail here.

And so it is in all cases of accident prevention that only by the most careful consideration of special conditions involved, with a due weighing of the financial demands, can an industry hope to be of maximum use to the public it serves and at the same time render its service at reasonable rates.

The Power Situation in the West

The strain of the nation's industrial activity is in a large measure being borne today by the power companies throughout the length and breadth of the land.

In the West this call for increased power demands has created a situation hitherto unknown in the commercial and engineering development of this section so prolific in possibilities for vast water power generation.

So acute has the demand for power become that the problem of how additional electric energy may be supplied is now the most serious one before central station managers of the West.

This state of affairs is practically the same in all districts of the West with the possible exception of eastern Washington and even in this latter district, the paying of the current month's power supply to the Washington Water Power Company for the new extension of the Milwaukee Railroad electrification means that this district, too, will soon be no exception to the power situation elsewhere to be found.

In these districts where power shortage has become extremely acute, the demand for still more power can be met to a limited extent by additional calls upon the steam auxiliary plants connecting with the various systems. But this power is of course expensive due to the present high prices of oil and other fuels. And even this power is limited to the present installed capacity of such plants.

As for hydroelectric extensions the great advance in cost of materials makes the initial installations of today almost double that of a season back. Then, too, deliveries are so slow as to make an immediate installation of large proportions practically an impossibility. Again, the difficulty of securing further moneys for private investments of this nature is noticeable on all sides due to the heavy financial demands of the government and the present low prices of stocks and bonds or even utilities of the very highest grade. The diverting of such private funds as might otherwise be available into munitions and other projects of immediate high return value is also having its effect.

Hence a rather anomalous state of affairs exists today in the West. Never before in its history have its hydroelectric utilities been more widely brought into activity and yet due to the exigencies of world stress, the actual net returns for power sales are below normal.

Hence when considering the advisability of granting increases in power rates either for new industrial activities or for old customers, the public should be cautious in passing adverse comment before data on all the very unusual factors affecting rates can be properly brought out in public hearings.

A New Field for the Contractor-Dealer

Almost every one employs some one in his business. Almost every one is sure that the person whom he employs might have been better fitted to meet his needs when he first employed him—he figures up the cost of the 'breaking in' process and reluctantly adds it to the necessary expenses of his business. With large concerns this loss is not a trifling matter, but mounts up into thousands of dollars annually—and yet business men generally, except as they are taxpayers or fathers, are inclined to take but little interest in our school systems. The public school is trying to do the same thing to the child that the employer is—to make a good citizen and a good employee out of him—but the school has the first and the longer chance. That it does not achieve better results, that the employer must still do so much by way of education, is largely the employer's fault, for he has not made of the public school system what he might.

And right here is the new opportunity of the electrical contractor and dealer. The children of the

schools need the new ideas that are being evolved in the electrical industry. They should see new appliances, and hear of the new uses of electrical application. They should have that mental stimulus that comes from writing and talking of the thing that today is regenerating and liberating the home — the method electrical. W. R. Putnam, a well known sales-manager of one of the largest power companies of the West, recently brought out this necessity of appealing to the kiddies as a means for upbuilding the electrical industry. At the same time its wholesome effect on the children is very desirable.

Then, too, the electrical contractor and dealer should not neglect to take an active interest in looking into methods of school support and in being a factor in its upward progress. Perhaps a school bond issue is being voted on in your home district — did you bother to vote for it? Better support is being asked for our schools everywhere—are you giving it? The Junior College movement is a peculiarly western institution. It is designed to meet the needs of the workman who will fill a place in life somewhere between the artisan and the professional man. The high school can cover only the most elementary of technical work; the university does not touch the field at all except as it interests the professional man. This intermediary school could be made industry's very own—confess that you do not know whether your city possesses such an institution, nor why it does not. Under the Smith Hughes law in California for instance, special courses in vocational work—the work of your vocation as well—are to be included in the school curriculum. Do you know that appointments and policies under that act are now being shaped in our state capitals? All this is the merest good citizenship—but it is also good business. And the electrical contractor and dealer cannot afford to overlook it.

The Portability of the Electric Motor

Waste of industrial effort that we all decry so at the present time is still discernible in many quarters. Comment has before been made in these columns relative to the use of the electric drive on temporary jobs and its consequent saving in time, energy and money.

The recent loss of considerable sums of money by contractors handling certain temporary construction work in the building of dams is directly traceable to either ignorance concerning the adaptability of the electric motor or prejudice in favor of other less efficient means of operation.

So much of the present industrial activity is of a nature that is temporary in character that the power salesman is overlooking such installations in many instances. Used motors, kept on tab by the commercial department for just such work, often prove of great value not only in promoting income for the company but by increasing the efficiency of human effort in the present industrial trials of the nation. No better patriotic move could be made to help win the war.

Let each one that reads this editorial go over in mind again not only the junk heap with its possibility of salvage but, when an idle motor is observed, see if its use due to its portable character can not be made to do a greater service. Thus will the power company, the industry and the nation jointly profit in this lessened idleness.

An Interesting Problem in Dam Design

The extreme height to which the modern concrete dam has been built brings out each day new and interesting problems. In the West where storage supply has as a rule been developed only as need for it has arisen the subsequent additions to concrete dams offer an unusual problem that today is not wholly disposed of in dam design.

Two instances of current interest to engineers are the Huntington Lake Dam of the Southern California Edison Company and the Spaulding Dam of the Pacific Gas and Electric Company. In both these structures an additional height of dam is contemplated. In fact at the former dam work is now under way in its raising to greater height.

Since these dams are used for storage purposes it is of course evident that the pressure at the center of the arch is greater when the reservoir is full as compared with little or no storage. As a consequence the elastic give known to exist in such instances makes the proper distribution of burden upon subsequent additions to the dam a problem of much thought and study.

In the case of the Spaulding dam by means of coils buried in the concrete an investigation has been made to determine the temperature at which the setting of the concrete takes place, and with this factor determined the total shrinkage due to temperature and natural shrinkage thus make possible the determination of factors to be allowed for in the subsequent joining of additional elements built up in the rear from the foundation in order to carry the extra height of dam, so that this new element may carry its proper share of the load.

The manner in which this problem is being solved by various engineers of the West is being watched with unusual interest.

THE NEW JOURNAL SERVICE: The entire electrical industry is founded on patents, old and new. The importance of understanding patent law, the methods of application, renewal, etc—to the man who deals with patented material as well as to the inventor himself, has led the Journal of Electricity to arrange for a series of articles on this and related subjects. The current number contains a general discussion of Patent Law by Wm. K. White and H. G. Prost and subsequent articles in our coming issues by this prominent firm of patent attorneys will cover such subjects as: Applications for Letters Patent, The Specification, The Claims, Actions by the Patent Office, Amendments and Arguments, Appeals, Renewals and Reissues, Assignments and Licenses, etc. Recent inventions of interest to the electrical industry, particularly those which emanate from the west, will here be featured and discussed authoritatively. This is a unique service of its kind and with the constant development in the electrical industry, should prove of timely value to our readers.

Special care is being given the question of prompt and perfect delivery. Should any subscriber fail to receive the Journal of Electricity promptly and regularly, he should communicate immediately with the Service Department, Technical Publishing Company, San Francisco.

CONSTRUCTION OF A UNIQUE POWER PLANT

(New records in hydroelectric achievement are constantly being established throughout the West, now recognized the world over for its romance and daring in engineering accomplishment. Here are interesting and unique features of a new power plant of the Pacific Gas & Electric Company which is situated immediately below the great Spaulding Dam. The power house is located in an enclosure hewn within a granite ledge. The water turbine unit, especially equipped with bypass valves, uses a head which may vary from 180 ft. to practically nothing.—The Editor.)

J. P. Jollyman and the Giant Glacial Boulders near Spaulding

IN the issue of the Journal of Electricity for September 30, 1916, an account was given which set forth in detail the several proposed power house units of the Spaulding Lake development of the Pacific Gas and Electric Company.

The early completion of the Spaulding Power House situated immediately below the giant Spaulding dam is being followed with unusual interest by engineers generally, not so much due to the size of unit that is being installed, since its output is modest in proportion, but bue to the unusual and unique features involved in design and construction.

Briefly these features are the erection of a snow shed for the workmen and operators to go to and from their work during winter months, the method of conveying the material to the power house over a precipiitous granite slope, the boring or chiseling of the power house itself situated wholly within native granite, the installation of a vertical water unit when preparation had been made for a horizontal unit, and design for the operation of the hydraulic unit under a variable head which may at times be 180 ft. and at other times nothing.

As may be observed in the illustration the power house is situated below the Spaulding dam and since the waters of this reservoir are drained by a pressure tunnel, driven through solid granite to a point at which the power house is located and then carried by tunnel for some thirty-three hundred feet more, it has been necessary to chisel out an interior operating room some twenty-five feet high and thirty feet in breadth, cutting into a depth ledge about seventy-five feet in order to properly tap the pressure tunnel from the Spaulding reservoir.

That the power wires may be taken from this house of rock without obstruction from the winter snow a concrete tower 48 ft. high over all is built at the main entrance.

Lowering the Heavy Machinery by Skids over the Precipitous Granite Ledge

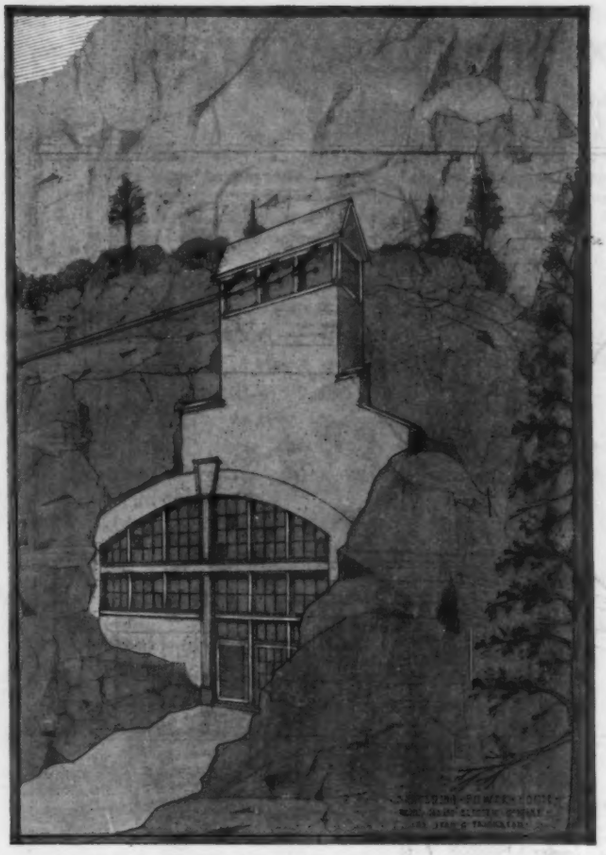
The approach to the power house being on a precipitous granite ledge, it has been necessary to erect a line of snow sheds from the level above to the entrance below as seen in the illustration, so that the operators may go to and from their work during the winter months.

This precipitous ledge has also caused an unusual problem for the conveying of the material for installation. The material was first brought by rail to the depot above and then such articles as weighed less than five tons were conveyed by cable to the tram below as shown in the illustration. On the other hand the heavier material was lowered on a skid to the tram and then installed in place within the granite enclosure.

THE POWER HOUSE AND THE GRANITE LEDGE

Here may be seen the power house front emerging from the granite walls in the lower right hand corner, while to the left above are the giant Spaulding dam, the tram, the skidway, the snow sheds and the rock crusher.

Due to the fact that preparation in design had been made for a horizontal 5000 h.p. unit, the later change over to a vertical unit made several unusual



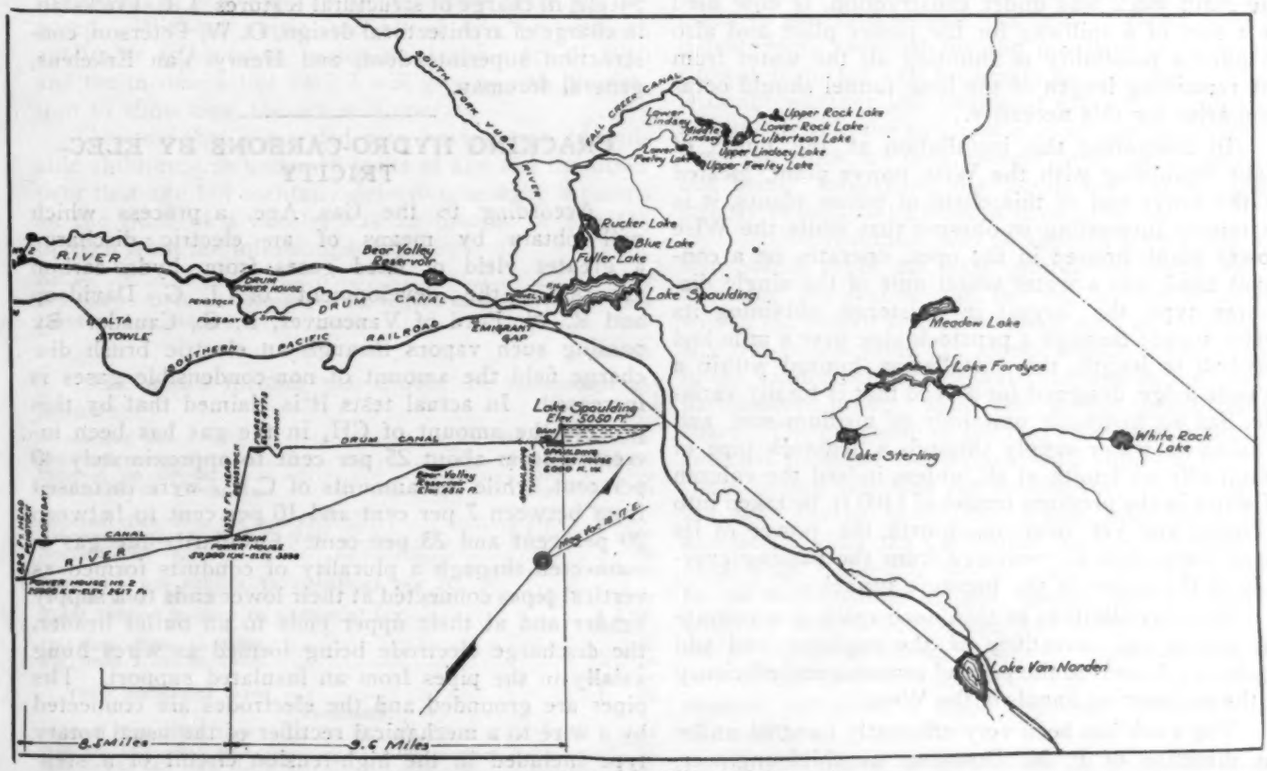
The Power House Front Emerging from the Native Granite

problems arise because of the granite walls encountered on all sides. The lowering of the turbine shaft into place for instance was accomplished by removing the hook on the traveling crane. Physical connection between crane and shaft was effected by bolting the crane stub to the shaft, bored and grooved specially for the work.

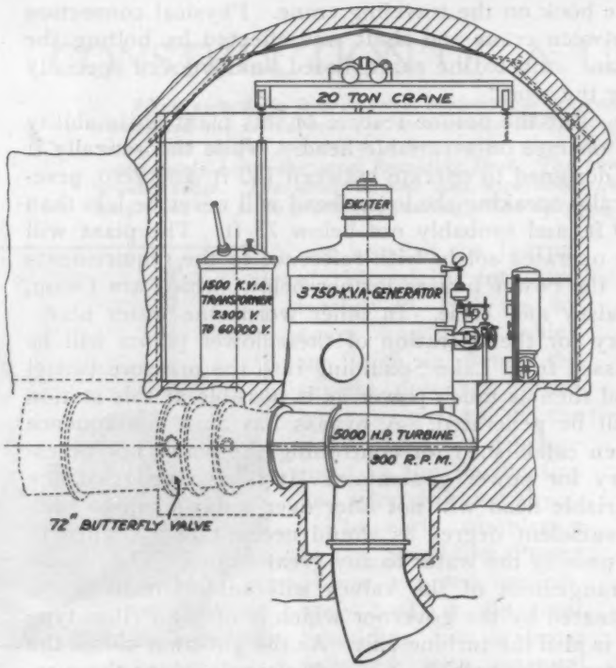
But the unique feature of this plant is its ability to operate on a variable head. While theoretically it is designed to operate between 180 ft. and zero, practically speaking the lower head will never be less than 50 ft. and probably not below 75 ft. The plant will be operated solely with reference to the requirements of the power houses farther below, which are Drum, Halsey and Wise. In other words the water necessary for the operation of these lower plants will be passed from Lake Spaulding into the pressure tunnel and then as much power as is possible at this station will be generated. A bypass has as a consequence been established for controlling the water not necessary for power generation. It is assumed that the variable head will not alter over a day's run to such a sufficient degree as would necessitate a change in bypassing the water to any great degree. The bypass arrangement of the valves will automatically open, actuated by the governor which is of the Pelton type as is also the turbine unit. As the governor closes the gates of the turbine, it simultaneously opens these relief valves in such a manner as to give a constant supply of water to the power houses in the system below.

The generator is of the General Electric design and is mounted directly on the vertical shaft, passing through the turbine unit. Its rated capacity is 3750 kva., 2300 volts, and has an operating speed of 300 r.p.m.

The oil switches are installed with disconnecting by-passes so that they may be put out of commission at any time without shutting down the plant.



Map of the Upper Spaulding Development



The New Installation in Cross-section

The three transformers are of the Westinghouse design and transform from 2300 volts delta to 60,000 volts Y with grounded neutrals. Horn gap lightning arresters are installed with water columns arranged in such a manner as to give steam vent in order to maintain a one ampere discharge current.

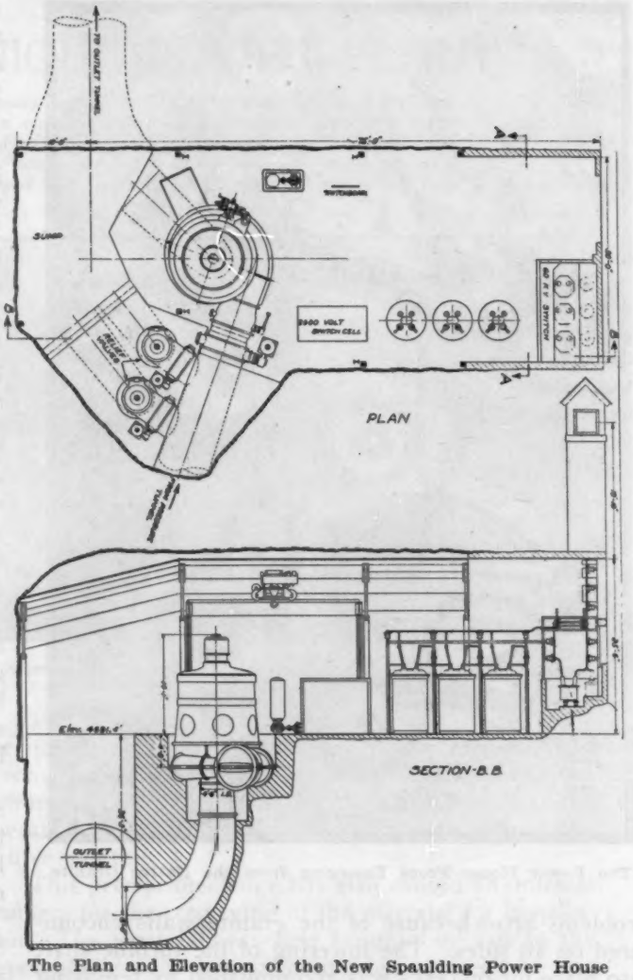
The draft tube is unique in that a section 4 ft. long is of cast iron and split so as to make its removal a matter of minimum effort in case of emergency.

The working adit of the long tunnel, driven when the main work was under construction, is now used as a sort of a spillway for the power plant and also to offer a possibility of shunting all the water from the remaining length of the long tunnel should occasion arise for this necessity.

In comparing this installation at the outlet of Lake Spaulding with the Wise power plant, located at the lower end of this chain of power plants, it is extremely interesting to observe that while the Wise power plant, housed in the open, operates on a constant head, has a water wheel unit of the single discharge type the largest in existence, obtaining its water supply through a penstock pipe over a mile and one-half in length, this installation, housed within a granite ledge, designed for a head that is totally variable, has an hydraulic unit only of medium size, and obtains its water supply through a penstock pipe of practically no length at all, unless indeed the column of water in the pressure tunnel of 1100 ft. be taken into account, and yet over one-fourth the power of its giant competitor is recovered from the passing energies of the water in the pressure tunnel.

Such installations as this, once again demonstrate the genius and versatility of the engineer and add again new laurels to the page of romance and efficiency in the engineering annals of the West.

The work has been very efficiently handled under the direction of P. M. Downing, as chief engineer, J. P. Jollyman, in charge of electric construction, R. C. Steele, in charge of structural features, I. C. Frickstad, in charge of architectural design, O. W. Peterson, construction superintendent, and Henry Van Erkelens, general foreman.



The Plan and Elevation of the New Spaulding Power House

CRACKING HYDRO-CARBONS BY ELECTRICITY

According to the Gas Age, a process which will obtain by means of an electric discharge a greater yield of fixed gases from hydro-carbon vapors is the development of J. G. Davidson and R. W. Ford of Vancouver, B. C., Canada. By passing such vapors thraugh an electric brush discharge field the amount of non-condensible gases is increased. In actual tests it is claimed that by this process the amount of CH_4 in the gas has been increased from about 25 per cent to approximately 40 per cent, while the amounts of C_nH_{2n} were increased from between 7 per cent and 10 per cent to between 20 per cent and 23 per cent. Ordinarily the gas is connected through a plurality of conduits formed as vertical pipes connected at their lower ends to a supply header and at their upper ends to an outlet header, the discharge electrode being formed as wires hung axially in the pipes from an insulated support. The pipes are grounded and the electrodes are connected by a wire to a mechanical rectifier of the usual rotary type included in the high-tension circuit of a step-up transformer, the rectifier connected to ground.

THE INCOME TAX AND YOUR INCOME

BY CHARLES P. CUTTEN

(If you earn more than a thousand a year, you are going to have to give some of it to the government—if you do not you will find that you are giving it by way of higher prices to the man who does have to pay the tax. A clear and comprehensive statement of just how this tax will affect you is given in this article, which formed part of an address delivered recently before the San Francisco Electrical Development and Jovian League. The author is state senator and an attorney for the Pacific Gas & Electric Company.—The Editor.)

The War Revenue Act of 1917 entitled "An act to provide revenue to defray war expenses and for other purposes" was approved by the President on October 3, 1917. It went into effect, except as to the taxes where the effective date will be given later, on October 4, 1917.

The act levys a number of distinct, direct taxes specified in the act as follows:

1. War Income Tax.
2. War Excess profit Tax.
3. War Tax on Beverages.
4. War Tax on Cigars, Tobacco and Manufacturers thereof.
5. War Tax on Facilities furnished by Public Utilities and Insurance.
6. War Excise Taxes.
7. War Tax on Admissions and Dues.
8. War Stamp Taxes.
9. War Estate Tax.
10. Postal Rates and Income Tax Amendments.

The act creating the War Income Tax of 1917 and amending the Income Tax Act of 1917 provides two distinct and separate income taxes. In addition to the normal tax of 2 per cent, under the 1916 law, a war normal income tax of 2 per cent is imposed on individuals making the total normal tax on individuals 4 per cent. In addition to the additional taxes, under the 1916 law, new war additional income taxes are imposed. Without going into all of the percentages applicable to incomes, under the income act of 1916 and the income act of 1917, I will give you an illustration to show how the act will operate.

Assume that a married man having two dependable children, one under 18 years of age and the other over that age but mentally defective, making a return as the head of a family, has an income of $10,000, derived from the following sources:

Salary	$ 6,000
Interest on U. S. and Municipal bonds (tax exempt)	2,000
Dividends on Stock	2,000
	$10,000

The man's income tax should be computed as follows:

Normal Tax.	1916 Law	1917 Law
Personal exemption	$ 4400	$ 2,400
Interest on Bonds	2000	2,000
Dividends on Stock	2000	2,000
(Normal Tax does not apply)	$ 8400	$ 6,400
Amount subject to Normal Tax	$ 1600	$ 3,600
Normal Tax of 2%	32	72
Securities not subject to additional tax (U. S. and Mun. Bonds)	$ 2000	2,000
Total Income Subject to additional tax		$ 8,000
1% from $5000 to $7500		25
2% from $7500 to $8000		10
Total additional taxes		$ 35
Summary.		
Normal Tax—1916 Law		$ 32
Normal Tax—1917 Law		72
Additional tax—1917 Law		35
Total Tax		$ 139

The new rates on individuals apply to the calendar year 1917 and subsequent calendar years. The provisions for personal exemptions accorded to individuals under the 1916 law are amended by providing in addition to the exemption of $3000 to unmarried and $4000 to married persons or heads of families; an exemption of $200 to heads of families for each dependent child under 18 years of age and for each child mentally or physically defective.

Under the new war income tax of 1917 the exemptions are $1000 to unmarried and $2000 to married persons or heads of families with an additional exemption of $200 to heads of families for each dependent child under 18 years of age and for each child mentally or physically defective. There is some doubt whether the $200 exemption for a minor or defective child is allowed under the war income tax. It is believed, however, that under a fair construction of the act it will be allowed. Similar personal exemptions are allowed to guardians and trustees for each ward or beneficiary. The estates of deceased persons are accorded an exemption of $3000 under the 1916 act and $1000 for the new war income tax. Returns will be required for all individuals having a net income of $1,000 or over if unmarried or living apart from husband or wife and $2000 or over if married or the head of a family. Certain material amendments have been made to the 1916 income tax law. Interest paid on indebtedness incurred for the purchase of securities exempt from tax can no longer be deducted. There is doubt whether this provision extends to indebtedness incurred in the purchase of stock, as the dividends from the stock are only exempt from the normal tax and being subject to the additional taxes cannot strictly be said to be exempt from taxation.

No deduction will be allowed for income and war excess profit tax paid during the year, but in assessing the income tax the net income embraced within the return will be credited with the amount of any war excess profit tax assessed upon the tax payer in the same calendar or fiscal year, and in the case of partnership profits with the proper proportionate share. The net result of the two provisions is that the Internal Revenue Department will subtract from income, before assessing the income tax, the amount of any war excess profit tax which may have been assessed against tax payers for the same calendar or fiscal year. The provisions of the 1916 law relating to the withholding at the source, excepting those affecting non-resident aliens, and in the case of interest on bonds or other securities containing the so-called "tax free covenant" are repealed, and in lieu thereof, provision is made requiring information at the source.

Contributions or gifts made to religious, charitable, scientific or educational institutions, etc. to an

amount not in excess of 15 per cent of the tax payer's taxable net income, computed without deducting such gifts, are allowed as deductions under regulations to be issued by the Internal Revenue Department.

Income Tax on Corporations

In addition to the tax of 2 per cent, provided in the 1916 law as amended, there is imposed by the 1917 law a war income tax of 4 per cent making the total income tax on corporations 6 per cent of net earnings. An additional tax of 10 per cent is imposed upon the amount of net income of every corporation received during the year which remains undistributed 6 months after the end of each calendar or fiscal year, except such income as is actually invested in the business or is retained for employment in the reasonable requirements of the business or is invested in United States Bonds issued after September 1, 1917. Under the war income tax of 1917, the income of corporations shall be credited with the amount of dividends on capital stock of corporations which are taxable under that act. This provision does not apply to the act of 1916 as amended.

War Excess Profit Tax

The present excess profit tax of March 3, 1917 is repealed. All corporations and individuals carrying on a business or trade are taxable except:—

1. Corporations exempt from taxes under the provisions of Sec. 11 of the 1916 income tax law and partnerships doing similar business;
2. Compensation of Government employees, state, federal, city, etc.;
3. Business carried on by
   (a) A corporation, the net income of which, during the taxable year, is less than $3000.
   (b) A partnership or individual having a net income from trade or business during the taxable year of less than $6000.
4. Business organized since January 1, 1913, the net income of which is less than 8 per cent of actual capital invested for the taxable year plus $3000 in the case of corporations and plus $6000 in the case of individuals and partnerships.

The basis of the tax is invested capital, which means under the law, "actual cash paid in" and the actual cash value of other property where cash has not been paid for such property. Before the excess profit tax is figured, a deduction from the net income is allowed in an amount equal to the same percentage of invested capital for the taxable year which the net income for the pre-war period bears to the invested capital for such period. But such deduction shall not be less than 7 per cent nor more than 9 per cent of the invested capital of the taxable year. There is also allowed a further deduction of $3000 in the case of corporations and $6000 in the case of individuals and partnerships. The rate of tax will be as follows:

1. 20 per cent of the amount of the net income in excess of the deductions explained above and not in excess of 15 per cent of the invested capital of the taxable year.
2. 25 per cent of the amount of the net income in excess of 15 per cent and not in excess of 20 per cent of such capital.
3. 35 per cent of the amount of the net income in excess of 20 per cent and not in excess of 25 per cent of such capital.
4. 45 per cent of the amount of the net income in excess of 25 per cent and not in excess of 33 per cent of such capital.
5. 60 per cent of the amount of the net income in excess of 33 per cent of such capital.

A brief example will illustrate the method of computing the tax.

Assume a corporation whose average pre-war net income was $1,000,000 which earned in 1917 $4,600,000 and that the invested capital for the pre-war period was $12,500,000 and in 1917 it was $15,000,000.

It will be noted that the earnings of the corporation during the pre-war period were 8 per cent on the invested capital for such period.

1917 net income		$4,600,000
Deductions:		
8% of $15,000,000	$1,200,000	
Specific deduction of	3,000	1,203,000
		$3,397,000
Tax Computation.		
20% of net income not exceeding 15% of $15,000,000, or	$2,250,000	
Less above deductions	1,203,000	Am't of Tax
Amount taxable at 20%	$1,047,000 —	$ 209,400
25% of net income on 5% of $15,000,000 or	$ 750,000 —	187,500
35% of net income on 5% of $15,000,000 or	750,000 —	262,500
45% on balance of net income which does exceed 33% of $15,000,000, or	850,000 —	382,500
Totals	$3,397,000 —	$1,041,900

It is provided that a trade or business having no invested capital or not more than a nominal capital shall, in lieu of the tax herein provided, be taxed at the rate of 8 per cent on net income after allowing for the specific deduction of $3000 or $6000 for domestic corporation or partnership or individual, as the case may be. It is believed that the above tax of 8 per cent applies to all salaries above $6000 except in the case of exempt government officials or employees. If this construction of the act is accepted, it will mean that a professional man with a taxable income of $10,000 or a salaried official drawing a taxable income of $10,000 a year would have to pay in taxes $120 under the act of 1916 $235 under the war income act of 1917 and $320 under the excess profit act of 1917, making a total of $675 in direct government taxes. Of course, if he pays interest or taxes, his taxable income will be correspondingly reduced. If, however, he received $10,000 from investment, his tax would only be $355.00.

War Tax on Facilities Furnished by Public Utilities (Effective Nov. 1, 1917.)

These taxes are to be paid by a person paying for the service. Express—from a point to another point in the United States for each 20 cents paid therefor 1 cent. Freight—from a point in the United States to another in the United States on amount paid therefor 3 per cent. Pipe line—for the transportation of oil by pipe line on amount paid therefor 5 per cent. Seats, berths or state-room tickets in sleeping or parlor cars or on vessels on amount paid therefor 10 per cent. Telegraph, telephone or radio dispatches and messages originating within the United States—each message or dispatch of 15 cents or more, on amount paid therefor 5 cents.

On life insurance the tax will be 8 cents on each $100 or fraction of the amount of the policy. On marine, inland and fire insurance 1 cent on each dollar or fraction of the premium charged. On casualty insurance 1 cent on each dollar of the premium charged. These taxes are paid by the corporations or associations which issue the policies.

BETTER OFFICE METHODS

BY H. H. WADE

(More effective study in the daily dispatch of office routine is the crying need of the hour. Here is an excellent series of suggestions by the assistant auditor of the Portland Railway, Light & Power Co. which should prove helpful to all engaged in the study of improved office methods. These suggestions were embodied in the recent compilation of wrinkles for the convention of the Northwest Electric Light and Power Association at Spokane.—The Editor.)

About June 1st, 1916, a new head was appointed to supervise the work of auditing conductors' accounts, a sub-department under the general auditor. The time seemed appropriate to make a thorough study of the work of this department, to determine:

First: Whether the various operations involved were properly co-ordinated.

Second: Whether the clerks were engaged in the operations to which each was best adapted.

Third: What methods might be employed to speed up the work, to the mutual benefit of employes and the company?

Taking these three subjects in order:

First: With the exception of a few minor changes, we found no need for changing the routine of the work.

Second: In order to form an intelligent opinion as to the relative efficiency of the individual employees, we at once concluded that some daily record was necessary which would show just how much of each operation was performed by each clerk; the time required to do it; and the character of the work turned out, as to accuracy and legibility.

It might be well to explain, for the benefit of those who are not familiar with the detail of the work being described, that, with us, the auditing of the conductors' accounts consists of a comparison of the actual daily turn-in of each conductor (cash, tickets and transfers) with the amounts of each which have been recorded on the fare register.

Our check sheets are so arranged as to provide parallel columns for the recording of actual amounts turned in side by side with amounts called for by the register.

With the above arrangement in mind, it will be clear to the reader that any mistake, whether made in counting, entering, or in balancing the sheets, would result in a discrepancy appearing, as between the conductors' turn-in and the amount registered.

Before charging the conductor with such discrepancies, we first re-check all such differences so as to be certain that no mistake has been made in the office work.

From the above, it is obvious that all mistakes in the above work would be about on a par, so far as their cost is concerned.

During the first two months we required each clerk to keep an accurate record of all work performed, on a specially printed blank, which provided for the following columns:

Date	Operation	Start	Finish	Time	Quantity

At the end of two months our sheets, together with our personal knowledge of the work and the prevailing conditions, enabled us to establish a standard of quantity per hour (or other unit of time) for each operation. This standard was established at a point sufficiently high to demand close attention and considerable ability, but not at a point impossible of accomplishment without detriment to the worker. In other words, our aim was to make our standard possible of attainment to a first-class clerk.

Having now a medium for measuring the quantity of work turned out by each clerk and a standard performance for each operation, it remained only for us to combine this information with the information available relative to the accuracy and legibility of the work, and such general matters as general conduct, neatness in appearance, etc., in order to gauge the efficiency, or value to us, of each clerk. We therefore added to our original sheet showing the working record, the following columns, to be filled out by the head of the department:

Speed	Accuracy	Legibility	General Conduct	Neatness in Appearance
25%	50%	10%	10%	5%

Any clerk attaining the standard in all operations, without errors, who at the same time meets the conditions required in the other matters, is given a rating of 100 per cent. It was necessary, however, for us to apportion this total of 100 per cent to the various qualities, and we did so, as shown above.

Because of the cost entailed in re-checking occasioned by errors, we decided to place a value of 50 per cent for complete accuracy (errorless work) and to reduce this 50 per cent 5 per cent for each error made.

Realizing that speed was a most valuable quality we assigned to it a value of 25 per cent. The attainment of the standard entitled the clerk to the full 25 per cent and any failure to reach the standard reduced the 25 per cent proportionately.

Legibility, because of its value in reducing the liability for misreading figures, was assigned the value of 10 per cent. The full 10 per cent is allowed, unless, in the judgment of the department head, a carelessly made figure contributed to an error or caused delay.

In assigning 5 per cent to "Neatness in Appearance" we took cognizance of the psychological effect of cleanliness and trimness. As practically all of the clerks are young ladies, failures to earn the full mark of 5 per cent are rare.

From the very first the individual records have been the source of great interest to the clerks. A constant improvement in the work of every one has been very noticeable, and the competitive spirit has been strong. A comparative statement for the last five months gives a clear indication of the improvement in the work.

	Sept.	Oct.	Nov.	Dec.	Jan.
Average (all clerks).....	95.6%	97.3%	97.7%	98%	97%
Number of errors.....	411	194	169	150	205

It will be noticed that the January showing fell below previous months. This is explained by the extra efforts required to dispose of the work occasioned by the holidays and also by much sickness in

January, which amounted to nineteen days. That the work was completed without extra help is a decided tribute to the new conditions.

In order to fully appreciate the above improvement it is also necessary to take into consideration the facts that during the above period the force was reduced, with a salary saving of $261.50 per month, and that the work was increased approximately 3 per cent by the addition of nine more cars to the schedules.

In January of this year we decided to put a bonus system into effect, in recognition of the good work being done and as an incentive to its continuance. For this purpose we established two classes, because of certain conditions under which one class (transfer clerks) worked at a disadvantage. The following bonus was offered:

For General Clerks:

Clerks attaining	a	monthly	average	of	99	%,	$2.50
"	"	"	"	"	99½	%,	3.50
"	"	"	"	"	100	%,	5.00

For Transfer Clerks:

Clerks attaining	a	monthly	average	of	96	%,	$ 2.00
"	"	"	"	"	97	%,	3.00
"	"	"	"	"	98	%,	4.00
"	"	"	"	"	99	%,	5.00
"	"	"	"	"	100	%,	10.00

The bonus plan has now been in operation for two months. It has been well received by the clerks, and is unquestionably fulfilling its purpose, i. e., to stimulate the clerks into putting forth their best efforts and at the same time offering them a reward for their successful accomplishment of their tasks.

The writer does not pretend to any particular knowledge of so-called "scientific management," but he does thoroughly believe in the common sense rule of knowing, as nearly as practicable, exactly what value each employee has for his employer, in work turned out. The writer has always believed in the competitive spirit among fellow workmen; or, expressed in another way, making a game of work.

ELECTRICITY ON THE FARM

In a recent article in the Idaho Engineer, C. O. Crane gives some idea of the main uses to which electricity can be put on the farm:

One cent's worth of electricity at 10 cents per kilowatt hour will operate in the farm house:

One 16-candlepower mazda lamp for five hours.

A 6-pound flatiron 15 minutes.

An electric washer having a capacity of 12 sheets to the washerful long enough to wash 20 sheets.

An electric vacuum cleaner long enough to clean 450 square feet of carpet.

A pump long enough to raise 100 gallons of water 100 feet.

A radiant toaster long enough to produce 10 slices of toast.

A sewing machine two hours.

A 12-inch fan for two hours.

An electric percolator long enough to produce 6 cups of coffee.

A heating pad from 2 to 4 hours.

A domestic buffer and grinder for 1½ hours.

A chafing dish 12 minutes.

A foot warmer for one-half hour.

In the dairy, electric milking comes first, of course, then electric churns, cream separators and cold storage plants. In the shop the farmer should have an electric soldering iron, grindstone, forge blower and portable drill.

An electric motor should operate feed grinders, corn shellers, threshing machines, hay hoists, root cutters. The motor vehicle should be electrically run—the plow certainly. Electricity should provide heat for the poultry incubators and brooders.

Above all, the farmer should possess an electrically driven pumping plant to give him water for his irrigation just when he wants it.

In proof that the farmer is taking advantage of these applications statistics from Idaho are quoted:

There are now 1,770 rural customers using current for lighting residences and barns, 273 for domestic power, 312 for irrigation, 18 for grinding feed, 130 for cooking and water heating, 80 for washing machines, 1,220 for flatirons, and 1,060 for some of the other labor-saving domestic appliances.

PROCEDURE WITH GERMAN OWNED PATENTS

Legislation now before Congress provides for the prohibition of all trading with the enemy. Credits may not be extended, contracts made or debts paid or collected. Exceptions to the prohibitions of the bill are made expressly in connection with patents, trademarks, and copyrights. A person in Germany may file in the United States an application and may prosecute it, paying both official fees and fees of attorneys. If conditions attending the war prevent him from filing application, he may be granted a total period of 14 months after the war in which to act. These privileges are conditioned upon extension of like privileges by Germany to Americans. A special procedure is provided in order that there may be use of American patents, trade-marks, and copyrights, owned by persons in Germany. This procedure contemplates that citizens of the United States may apply to the agency the President designates for a license. If the grant is decided to be for the public welfare, a license to use may be issued, and may be exclusive or otherwise, according to circumstances. To the license conditions may be attached, including the price at which products may be sold. A licensee will file reports regarding his use, and will pay periodically to the Alien Property Custodian sums which are not to exceed 5 per cent of gross receipts from sales, or 5 per cent of the value of use as determined by the President. The owner of a patent, etc., under which a license is issued may within one year after the war ends file suit for a reasonable royalty in the federal court of the licensee's district.

TYPES OF LAMPS USED IN PARK LIGHTING

Some interesting figures on the types of lamps used for lighting parks are contained in a recently issued bulletin of the U. S. Census Bureau. The following statement shows the per cent relation of the number of lamps of each type:

Type of lamp.	—Per cent of total number.— Park lighting, 1916.	Street lighting, 1909.	Street lighting, 1907.
Electric arc	8.5	34.5	34.2
Incandescent electric	80.1	16.3	10.6
Gas	6.2	41.5	45.1
All other	5.3	7.7	10.1

SHORT JOURNEYS IN PACIFIC LANDS

STOPPING PLACES FOR THE ENGINEER IN YOKOHAMA

Between Stopping Places—Moonlight on the Pacific

UPON arriving at Yokohama, the little brawny brown swimmers who meet the boat at Honolulu have now given way to a gleaming, smiling row of little brown men with big thatched hats that seem to rest in space about two inches above the wearer's head without any visible means of connection between the hat and the anatomy of the human figure before you. Upon stopping to listen to their cry, you finally come to the realization of what they really want you to do. What they want you to do is this: to get in the over-grown, two-wheeled baby carriage they are pulling and they will take you to the Grand Hotel!

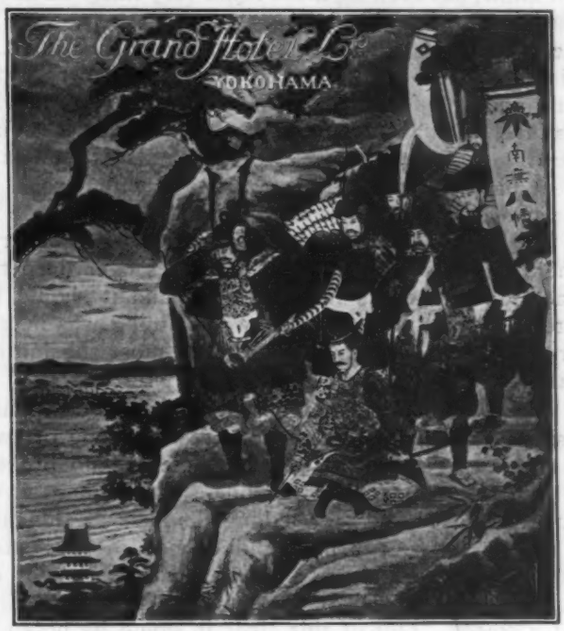
I was, however, like the girl of immortal fame, "willing to try anything once." Upon arriving at the hotel in this particular kind of "pullman" special, I came to the conclusion that the soft tread of the human mechanism before me and the easy springy motion of the rickshaw were an experience long to be cherished in the annals of experience in lands far from home.

The Grand Hotel is Dignified and Well Appointed

At the Grand Hotel, situated along the famous "Bund" or water front of Yokohama, the view is truly delightful. The hundred islands that sink away in the distant horizon awaken one to the charm of the new surroundings. The busy ships loading and unloading cargoes on all sides, flying strange new flags from their masts, remind one that he is indeed far from home. The warships quietly at anchor the day I spent at the Grand served not to waken even a single pang that in scarcely two months there would be enacted the world's greatest tragedy, and that the white cleanly decked cruiser lying so peacefully at anchor before our eyes, should so soon be ruffled by every angry passion that at such times grips the human breast, to go down in history as "Emden, the scourge of the seas."

And so in this peaceful frame of mind we prepared for the evening meal. Accustomed to American hours we repaired to the spacious dining room at six-thirty o'clock to find the delightful music being rendered was not for the evening meal, but was the occasion of a brilliantly gowned and groomed exhibition of the dansant, participated in by the elite of the foreign residents of Yokohama.

At seven o'clock the dansant adjourned and was followed at seven-thirty (this is the usual time for the evening meal in the Orient) by the formal meal of the hotel. The menu card furnished was delightfully decorated in Japanese colors of red, blue, and green, and represented some of the mythological life of Japan. Upon the inside was to be found the names of the ten selections of music excellently rendered by Dziurzynski, the band-master. On the opposite side were listed the thirty-six tempting dishes which comprised



Menu Card at the Grand Hotel, Yokohama

the evening Table d' Hote dinner. In passing, it is to be noted that the dishes are all numbered for the practical reason that the waiters do not all speak fluent English. Since, however, they can carry the numbers in their heads better than the names of the dishes, this gives a certain and sure escape from the embarrassment that would arise over bringing the wrong order.

The central location of this hotel puts it in easy reach of all points of interest in Yokohama, whether you are upon pleasure or business bent.

The Bluff Hotel Offers a Quiet and Delightful Retreat at Yokohama

If one should desire an informal residence in Yokohama somewhat removed from the business district, the Bluff Hotel will be found most reasonable and satisfactory. Overlooking the city of Yokohama in one direction and Mississippi Bay of Commodore Perry fame in the other, a more healthful, wholesome surrounding could not be found. The furnishings are not at all ambitions but nevertheless one has all the things necessary for his comfort. The meals, while served with simple easy taste, are yet most wholesome and delicious.

POWER DEVELOPMENT IN PERU

Arriving at Callao, Peru, I was much impressed with the good dock facilities there for handling freight from ships to railroad cars. Our ship, however, did not go to the dock for some reason unknown to me, but lay outside while the passengers with their baggage were unloaded in small boats. This condition is retarding transfer unnecessarily.

The custom house was not difficult to pass through, and very soon I found myself in a country new to me. Going up the valley along the Rimac River as far as Chosica, the soil looked as if anything would grow on it if irrigated. Irrigation is used here to a great extent, the water from the Rimac River being used. Whether all of the water is used, I do not know, but even so, more could very likely be developed by storing the flood waters in reservoirs up in the mountains. From Chosica the railroad begins to climb the steepest grades, at times as much as 4 per cent, and in a few hours brings a person from almost sea level to an altitude nearly 16,000 ft. This Peruvian Central Railroad follows the Rimac River, and is a great piece of engineering and construction work; it has taken quite a bit of nerve to go out and locate it, as the mountain sides are steep and rugged everywhere and difficult to climb. Bridges over deep ravines follow tunnels through cliffs, and it should be noted too, that these tunnels where lining was necessary, are lined with cut stone in the most substantial manner.

In front of all passenger trains going down hill a small hand car is run by gravity with one or two inspectors on to ascertain that there are no broken rails or other defects in the line. The Rimac River drops above Chosica for a long distance at the rate of about 300 ft. per mile and carried in the latter part of July, 1912, about 250 cubic feet (estimated) of water per second. This is supposed to be the low water season. Out of this river it would be possible to develop 6000 h.p. per mile with modern hydroelectric machinery. Probably a total of 150,000 h.p. could be economically developed with comparative ease, but there is no market for the power at the present time within a commercial transmission distance. Lima receives waterpower from this river from two stations located near Chosica. The drop in the river per mile at this location is not very large, but the transmission line to Lima is short. It has been suggested that the Peruvian Central Railroad should use waterpower for the propulsion of trains on their railroad, but their traffic is not heavy enough at the present time to warrant the extra investment in hydroelectric machinery.

Coming near to the summit the copper smelter of the Bachus & Johnson Company is passed. These two men I understand are principally responsible for the location and engineering of the Peruvian Central Railway and now they seem to be quite successful in digging copper out of the hills all around.

After reaching Oroya we started out in the hills to look for what we were after. The method adopted in prospecting for waterpower was as follows: First the whole territory was gone over quickly. All rivers and creeks that had any apparent power possibilities were investigated. The volume of water flowing was ascertained by using a Price current meter for finding the average velocity and by measuring the cross section of the stream. It was not possible to find the fall of the river very accurately when it had to be done quickly, but it was considered good enough for this first investigation to travel up or down the stream and take barometric readings at certain intervals. The estimated speed of travel was in most cases three miles per hour and it is of course in this item the greatest uncertainties enter in.

ABOVE THE TIMBER LINE

The bleak aspect of the higher Andes offers little to the beauty loving eye but holds much of interest to the engineer—for here the railroads climb the most precipitous mountain heights and undeveloped water powers lie waiting for the enterprise to utilize them.

All of the rivers and creeks in the territory in question are tributaries of the Amazon and at the time that this investigation was made, they were supposed to carry their extreme low water. While a great many of the streams investigated possessed power possibilities it was one of our duties to pick out the best for the first development and we found that all but two of the investigated streams could therefore be eliminated from further consideration after the preliminary investigation. Actual surveys were now made of the two streams found to be especially adapted for economical power development. One of these streams had three times as much fall per mile as the other one and was therefore the best from a hydraulic standpoint, but it was, however, located so far from the railroad that it was thought the hydraulic advantages it possessed would be more than compensated for by the fact that the other stream was located right along the railroad. This location was chosen and the power plant was built at this point.

GUATEMALA'S PURCHASES FROM UNITED STATES

The Guatemala market for steel rails, other steel products, agricultural implements, machinery used in connection with the coffee, rice, and sugar plantations, and practically all lines of hardware is now controlled by dealers in the United States. Before the European war much of the machinery used on the country estates, known in local parlance as "fincas," came from England, and other classes of machinery, particularly in Guatemalan breweries, came from Germany; but for the past two years practically all of this machinery has been brought from the United States.

WOMEN IN THE INDUSTRY

(With the increased employment of women in the electrical industry, new problems confront the employer. Of how much are they capable, how should they be treated, what of the situation after the war — what is the other man doing about it? This department will be devoted to the interests of women in electrical fields and of their employers.—The Editor.)

A WOMAN'S BAND AT THE UTAH STATE FAIR
Various of the big electrical companies have been encouraging all sorts of clubs and other interests among their employees, from orchestras to hiking clubs. That the musical part of this program need not be confined to the men's side of the forces is instanced by the success of this woman's band which furnished the best of music and considerable advertising at the Utah State Fair.

WOMEN AFTER THE WAR

What are we going to do when the men come back from the war? Are we forcing men out of positions where they belong to employ women at less salaries and calling it patriotic duty? To obviate such objections on the part of labor, Harry Franklin Porter of the National City Bank makes the following recommendations:—

1. Women will be employed to do what is now regarded as normally man's work only when the need is indubitable or will be as men are required for military service.

It is not in principle inconsistent to announce that, on the other hand, during the period of the war, no man will be hired for work which can be performed fully as well by a woman. A number of corporations, including several of the leading railroads, have already declared such a policy.

2. Women doing identical work will receive compensation as the same rate as the men they replace or supplement. In other words, sex will not be made a ground for difference in wage treatment.

This not only harmonizes with one of the principal demands of every organization for equal rights, but it is an assurance to the brave fellows who go to the front that their absence will not be utilized to debase the wage scale. That it may now be too high, which is undoubtedly the case in many lines, is not in point. If it is, let the readjustment be effected in frank dealing between the two parties directly concerned, without respect to sex, after the present emergency is over and industry returns to a peace-time basis. Now, at any rate, is not the time to resort to anything that savors in the slightest of subterfuge.

3. Men volunteering or selected for military service during the period of the war will be guaranteed their old or equally good positions; such absence, moreover, will not count against their record of continuous service unless they choose not to return.

Business men need have no hesitation in taking the above stand. It is a fairly safe assumption that many of the men now going to war will not want to return to their former occupations. Months in the out-of-doors will have created the desire for work in the open hereafter. Many of the returning soldiers will undoubtedly take up farming. Nor will such a shift be without its advantages. There will also be some (may the number be ever so few!) who will be incapacitated by injuries from resuming their former occupations; for these re-education in callings adapted to their new physical limitations will be necessary—which is a tremendous problem all by itself, demanding our best thought and attention. Instead, therefore, of returning soldiers creating embarrassment for manufacturers and other employers by calling upon them to release women who in the meantime have demonstrated their efficiency and desire to retain their positions, too few of the old men perhaps will re-apply.

WOMEN AS ELECTRIC RAILWAY EMPLOYEES

The labor situation which confronts the electric railways is so serious that there seem to be but two ways out—a war bonus or the employment of women. F. W. Brooks, President of the Detroit United Railways, in a recent article in the Electric Railway Journal expressed his opinion in favor of the latter course:

Under normal conditions, women have been employed in offices as secretaries, stenographers and clerks and, to a very limited extent, elsewhere.

In the mechanical, power, and track departments, women are used extensively as clerks, and it is the opinion of our department heads that they may be satisfactorily employed in other occupations, as in coil winding, controller work, upholstering, painting and glazing, as drill hands, switchboard and dynamo attendants, oilers, wipers, and in many like occupations that do not involve heavy lifting or severe out-of-door employment.

It is my opinion that women can perform the work of motormen and conductors satisfactorily. It is a current opinion that they may become excitable and lose control of their vehicle when contending with congested traffic conditions. I very much doubt the correctness of that view. It is to be understood, of course, that they must be especially trained with respect to that condition, and it is my observation that under such conditions women are driving taxicabs and other motor vehicles as successfully as men are doing like work. Both motormen and conductors are permitted to remain seated while on duty outside of restricted congested areas, and certainly the employment is not more severe than that performed by women in factories and probably as clerks in stores.

WOMEN IN PRESENT-DAY JAPAN

So completely has Japan swung into line with Western nations that today the field of men's occupations has been greatly encroached upon by women. A Japanese vernacular paper lists 64 occupations, formerly open to men only, now available to women.

The Imperial Railway Bureau employs some 4,000 women as ticket sellers, cashiers and bookkeepers. The Imperial Tobacco Monopoly Bureau finds use for some 6,000 women who earn up to one yen (50 cents) a day in the manufacture of cigars and cigarettes. These workers have a nine hour day and after each day's work they receive an hour's training in reading, penmanship, sewing, etc. The Imperial Arsenal employs a number of women, but here the work requires muscular strength rather than agile fingers or an active brain. While the remuneration is not so high the work is more attractive from the standpoint of health than that of the Tobacco Monopoly Bureau.

Then there are women artists, novelists, journalists, teachers, typists, musicians, actors, doctors and the exponents of the complicated flower arrangement and the tea ceremony.

The number of women clerks in banks and mercantile houses is on the increase. The Bank of Japan and the Hypothec Bank each employ over 120 women. While their salaries may only be from $5 to $15 per month, their lunches and work dresses are supplied by the bank and the workers participate in the semi-annual bonuses so popular in Japan's industrial and mercantile life. The telephone companies employ, as in this country, a number of women. Women typists, as a class, have by far the best positions, receiving as much as $50 a month. In the case of the school teachers what they lose in large salaries they make up in the higher social recognition and greater respect accorded them. Some actresses command as much as $150 a month but their surplus at the year's end is negligible,—the lure of fine clothes is ever present and too effective. Women doctors have sometimes had a practice which brought $3,000 a year but such cases are few and far between, the majority serving in hospitals for $25 to $50 a month.—[From "Japan Society," May 31, 1917.

DID IT EVER OCCUR TO YOU THAT:

In your present employment troubles, you might get a woman to write your advertisements in place of the man who has gone to the front? The woman has come to be an important purchaser of electric ware—why not a woman trained in domestic science to advertise your new range—or an expert in laundry methods to explain the merits of your electrical washing machine—or just a woman to understand and meet a woman's interest? This is not a new field for woman, of course—in fact so many of them are represented in the advertising game that a special section of them was represented at the Annual Convention of Advertising Clubs held in St. Louis in June of this year. There were women holding advertising positions in department stores, advertising agencies, magazines, commercial houses, technical fields—and they are making a success of it, too.

A REPLACEMENT SUGGESTION

The problem of replacing the men who may be called to the national service is prominent in the public mind, particularly in view of the growing fear that the war may last longer than we at first supposed. The Bulletin of the League for Business Opportunities for Women notes the following suggestion by one of the employees of a New York banking house: He proposes that wherever practicable every man who is of military age, and so subject to future call, though not liable on the first draft, should begin at once to train "his nearest qualified female relative" for his work.

The plan has certain definite advantages. It follows the French method of placing the sister in her brother's position, the wife in her husband's. It turns to account the woman's natural interest and enthusiasm in her husband's work and her desire to make good in order to hold his place for him. It assures her of an income, and yet saves the firm from the double salary to absent employee and his substitute, which is might otherwise attempt to pay as a patriotic duty. It solves the problem of readjustment after the war, because the wife takes the place avowedly as a substitute and not as a competitor. Though she has every incentive to do her best and succeed in the position, she is nevertheless merely holding the place temporarily, and is perfectly willing, even anxious, to surrender it to her husband when he comes back. Finally, it provides for her, in case he does not return, by training her to be self-supporting and supplying her with a position at one and the same time.

The measure of the success of such a plan is the intelligence and ability of the wife and the foresight and energy with which her husband takes up the subject of the preliminary training, and, it might be added, the persistence and patience of both. It rests upon the recognition now of a crisis that may come six months or a year or even two years hence, and the prudence and determination to begin immediately to get ready for that crisis by a real preparedness.

WOMEN IN TECHNICAL ELECTRICITY

Recently, due to the lack of technically trained men, the British Westinghouse Electric and Manufacturing Company, Manchester, England, has been obliged to consider the possibilities of employing university trained women in technical positions. While making provision for the special training of such women, it was realized that there were many young women of marked ability in the company's employ who, with a short course of specially designed training, could be used most efficiently on more important work than that which they are now doing. Classes are now held to provide this instruction. Two main courses are provided. One, which is subdivided into two parallel courses each of five hours per week, is intended for women of good general education who will be employed as assistant engineers, senior draughtswomen, or in commercial work requiring more technical knowledge. The second course, a drawing office course, is intended for women tracers, and they are trained to be draughtswomen.

Promotion is one of the main objects aimed at in holding the classes for women. The company has recently put forward a scheme for the promotion of its able employees, and for transferring people with ability that may not be used to the full in their present capacity.

CURRENT RATE FIXING PROBLEMS

BY C. E. GRUNSKY

(In the rate-case now on trial before the Master in Chancery involving the rates for gas charged by the San Francisco Gas & Electric Company, the author contended that the remuneration for management of public utilities, participation in general prosperity and allowance for hazard, that is to say what would ordinarily be classed as profit, might well be brought into some relation to the volume of business. In this article he shows this to be more logical than to attempt to bring these elements into relation to the capital invested or to value.—The Editor.)

MANAGEMENT, BUSINESS HAZARDS AND THE UNEARNED INCREMENT

All rate regulating authorities are devoting much thought and study to the establishment of a proper basis of calculation when the rates to be charged by public utilities are to be fixed.

The highest court has said that value must be the starting point and the attempt is therefore generally made to comply with this apparent requirement of the court. The result is the use of a rate-base conforming to "present value" or to something that may be called present value, even though in making value the rate-base it is occasionally found necessary to read new meanings into the word value. After this value has been ascertained in some fashion the owner of the utility is allowed to earn a return thereon, usually somewhat in excess of what would be a fair interest return on money for investment in enterprises of like character.

When there is included in the rate-base thus established an allowance for "going value," the interest return allowed and earned on this "going value," together with earnings to cover the excess of the return rate over the ordinary interest rate, is the owner's compensation for hazards and for management and may also cover some participation in the prosperity and increasing values of the property in the community which is served by the utility. If the allowance for hazards has been correctly estimated, the owner will in the long run get little or no advantage therefrom, because this allowance will be offset from time to time by losses or sacrifices of various kinds. The allowance for participation in the general prosperity is not always recognized as being due to the owner for the reason that a part thereof, under the prevailing system of using value as the basis of the calculation, makes its appearance in the increase of real estate values and in the increasing values resulting from the gradual but recognized rise in the price of materials and the rise in the wage scale. And yet every utility helps to create the general prosperity. It adds to the unearned increment of the vacant lot and unused field as well as to that of the lot or field whose owner is a rate-payer. Some share of this prosperity should go to the utility, even when its property items do not include appreciating real estate. But, even when the earnings cover fair allowances for hazard and for the unearned increment, the obligation of the public to the owner of the utility is not yet fully discharged. There should be proper compensation for management. It is not enough to allow the bare salaries of those who are entrusted with the management and operation. The owner is entitled to something more. He has brought into being and has placed at the service of the community, an effective organization the stability and efficiency of which is guaranteed, as in the case of a corporation-owner, by the character, judgment and business experience of a board of directors selected by the stock holders. The existence of the corporation, the business ability of its directors resulting in the energetic control of its affairs, the cash contribution by stock holders, the successful operation of the enterprise, or, in the case of the new venture, the implied guarantee of success, affords the basis for making loans and extends the ability of the public to enjoy transportation facilities or electric service, or gas and water supplies that might otherwise long be out of reach by reason of the limited borrowing capacity and lack of business ability of municipal organizations. The owner should be fully compensated for the service rendered. The mere payment of salaries to those who are actively engaged in the management is not full compensation for this service. The compensation for management even though not usually specifically referred to or separated from what might be called broadly the profit allowance, makes its appearance as a part of the excess of earnings above the actual cost of money (interest with due regard to discounts and commissions) after allowing for operating expenses and replacement requirements.

That there should be something in the earnings as compensation for management can hardly be questioned. There will, however, be difficulty in bringing the same into a satisfactory relation to the rate-base. This is equally true of the allowance which should be made for the participation in the general prosperity and is true to a less extent of the hazard allowance. All of these elements which should be covered in the earnings are more closely related to the volume of business than to the capital invested in the enterprise or to any rate-base built up from "value."

It happens occasionally that a public utility concern does a large volume of business on a small investment. Some of the express companies belong in this class. The case may readily be conceived, of such a concern which rents its office facilities and operates under contract with railroad and steamship companies and which outside of its trucks and other vehicles for local delivery, has made no investment of any moment. It would be in vain in such a case to attempt a regulation of rates based solely upon a fair return upon the invested capital. The whole field must be brought into view. The volume of business transacted is, in such a case, equally as important an element for consideration as is a rate-base when a limit is to be set upon the earnings.

An express company, as here assumed, has no appreciating property. Its share in the unearned increment of the country should be brought into some relation to the amount of service which it renders, that is, to the volume of its business.

The compensation for management likewise is intimately related to and should be figured with the volume of business as the starting point.

It would, of course, be quite as feasible to start with the total cost of operation instead of with the gross annual receipts when determining what should be allowed for management and what should be allowed to cover participation in general prosperity, but the gross income as a basis has obvious advantages. Bookkeeping will be simplified and the control is more readily effected. The annual cost of operation will be more difficult to ascertain and will show greater relative fluctuations than the annual gross income, and for the same allowance in the earnings, the per cent of the annual gross income will be less than the per cent of the operating cost, thus resulting in greater stability of the percentage allowance when once fixed.

From the standpoint of the public, there can be but little question that the compensation for management should, as here suggested, be brought into fair relation to the volume of business instead of making its appearance in the interest allowance on an arbitrarily established or assumed "going value." No basis has yet been discovered for estimating "going value" except capitalization of net profits. When, therefore, "going value" deduced from the opinion of experts, supported chiefly by assumptions, as distinguished from cost of developing business, is included in a rate-base, the procedure must appear illogical to the rate-payer and will always remain subject to attack, both as to principle and amount. The alternative procedure which is now suggested but which is novel and is here perhaps for the first time brought to the attention of a court, should appeal to all concerned as logical and in accord with the common practice in ordinary business affairs of allowing commissions based on the magnitude of the involved transaction.

To summarize:—

No argument seems to be required to prove the owner's right to compensation for management.

This compensation can not be brought into any definite or satisfactory relation to what I believe should be designated as the natural rate-base, which is the legitimate investment, usually determined from cost of reproduction including an allowance for cost of developing business but without deduction of depreciation, because the amount of business bears no definite relation to the amount of capital invested.

If this compensation is brought into some relation to value (including in value the going value of the concern), then the reasoning will be in a circle and the proceeding will be illogical and absurd.

It will always be fair to both the owner and the rate-payer to let this compensation be brought into a proper relation to the gross income.

The owner's share in the general prosperity of the community, under the customary procedure of the rate regulating authorities, is recognized in those cases in which the utility plant includes property which is appreciating in value. There may be some unearned increment, in addition thereto, concealed in the allowance for "going value" and in a rate of return in excess of the cost of borrowed money, but so long as one concern gets the unearned increment in large amount due to increasing values of real estate and other concerns apparently get none, the system will be at fault. The participation in general prosperity should, therefore, also be brought into relation to the volume of business and not to a rate-base.

The business hazard is contingent in part on the amount of capital which the owner has invested and in part on the cost of operation. The allowance for hazard if considered apart from obsolescence and from losses due to fortuitous events, which should ultimately fall on the public and not on the owner, will ordinarily be small and, if expressed in figures at all, can be readily brought into relation to the volume of business. It is not logical to bring it into relation to value which may be made up largely of intangibles. It is not logical either to bring it into definite relation to the natural rate-base. Hazard, too, therefore, had best be brought into some relation to the volume of business.

THE DETERIORATION OF WESTERN COAL IN STORAGE

A report on the deterioration in the heating value of coal during storage, covering a five-year period, has just been issued by the Bureau of Mines, Department of the Interior, as Bulletin 136, Horace C. Porter and F. K. Ovitz being authors.

The tests show that the amount of deterioration of coal in heating value during storage has commonly been overestimated. Except for the subbituminous Wyoming coal, no loss was observed in outdoor weathering greater than 1.2 per cent in the first year, or 2.1 per cent in two years.

The tests with New River and Pittsburgh coal were made to determine the advantage to be gained by storing coal under water, and particularly under salt water. The results show that storage of New River coal under water effectively prevents deterioration of calorific value and that storage in the air under severe conditions causes only small deterioration, about one per cent in one year's exposure and about two per cent in two years.

The Sheridan, Wyoming, subbituminous coal, known also as "black lignite," is commonly supposed to deteriorate rapidly in storage, especially by "slacking" or crumbling of the lumps. Under the conditions of the tests this coal lost 3 to 5.5 per cent of its heat value in two and three-fourths years' storage, the greater part of this loss being in the first nine months. In general, the lumps became badly cracked, but retained their form sufficiently to permit ready access of air. However, they were weakened so that they broke up badly on handling. By the use of bins with air tight bottoms and sides and a protecting layer of fine slack on the surface, the deterioration of Sheridan coal in heat value can probably be kept below 3 per cent in one year and the physical deterioration can also be largely prevented in the under portions of the pile.

FUEL OIL AND STEAM ENGINEERING

(New patents that have been issued recently at Washington show that inventors are still at work with ever increasing success in an attempt to improve the burner or atomizer used in fuel oil furnace operation. In this article the authors first classify the various types of burners that have found their way into practical application and then a well-known type of each class is described in detail and the good and bad features of each design are called to the attention of the reader. The discussion closes with a statement of the various types of boilers and their particular uses in fuel oil practice. —The Editor.)

BURNER CLASSIFICATION IN FUEL OIL PRACTICE

BY ROBERT SIBLEY AND CHAS. H. DELANY

In 1902 and 1903 the U. S. Naval Fuel Oil Board made an exhaustive inquiry into burners of various types. In their report a classification of burners was set forth which comprehensively details the fundamentals of various types of burners known as the drooling, the atomizer, the chamber, the injector, and the projector types.

In the drooling type the burner allows the oil to drool from an upper opening down to a lower opening from which the steam is issuing. An atomizer burner allows the oil to drop directly on the steam. The chamber or inside mixer atomizes the oil within the burner after which it issues from an orifice of the desired form. An injector burner is designed primarily to operate without a pump as it is presumed that the oil will be sucked from the reservoir by the siphoning or injector-like action of the steam jet inside. In the projector burners the steam blows the oil from the tip of the burner.

Two other general classifications prevail depending upon the character of the flame emitted—namely, the fan tail and the rose. In the former type the burner produces a flat flame while in the latter a circular flame is sent forth.

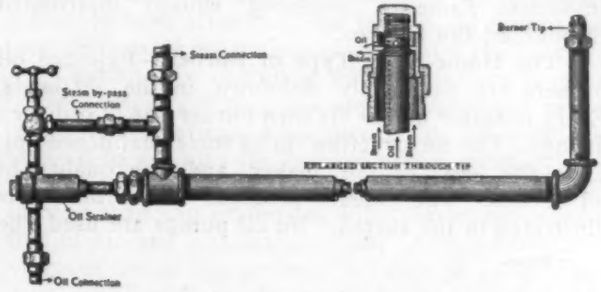
The three principal types of burner that are encountered in central station practice are, however, known as the **inside mixer,** the **outside mixer,** and the **mechanical atomizer.**

The Inside Mixer.—In burners of this class, the steam and oil come into contact, and the oil is atomized inside of the burner itself, and the mixture issues from the burner tip ready for combustion at once. The Hammel burner is of this type.

The accompanying cuts illustrate the construction of this burner. Oil enters at A, flows through D into the mixing and atomizing chamber C; steam enters at B, passes through F, E, and then through three small slots, G, H and I, into mixing chamber C where it meets the oil, and as these small steam jets cut across the oil stream at an angle, the energy of the steam is utilized. The burner requires for its operation about 2 per cent of the steam generated by the boiler. The heavy hydrocarbons of the oil are atomized, the light hydrocarbons are vaporized, and the completed mixture issues from the burner and ignites like a gas flame. In normal service there is no tendency to carbonize, and the only way in which carbonizing can be caused is by turning off the steam and leaving the burner filled with oil instead of blowing it out before shutting down.

All oil is usually more or less gritty and will cause wear of some part of the burner. This is provided for in the Hammel burner—the removable plates K K can be quickly replaced.

The Outside Mixer.—In the outside mixing class the steam flows through a narrow slot or horizontal row of small holes in the burner nozzle; the oil flows through a similar slot or hole above the steam orifice, and is picked up by the steam outside of the burner and atomization thus accomplished. The Peabody burner is typical of this class. It will be noted that the portions of the burner forming the orifice may be



THE OUTSIDE MIXER TYPE OF BURNER

In this type of burner the steam flows through a narrow slot or horizontal row of small holes in the burner nozzle. The oil flows through a similar slot or hole above the steam orifice and is picked up by the steam outside of the burner and thus atomized. The Peabody burner which is shown in this illustration is a typical burner of this type.

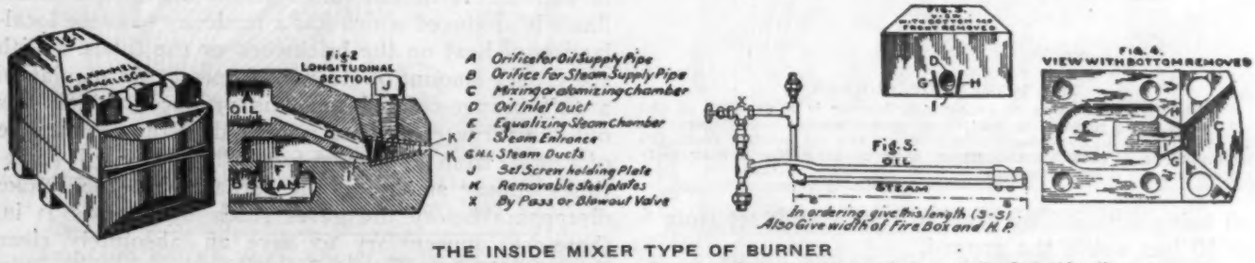


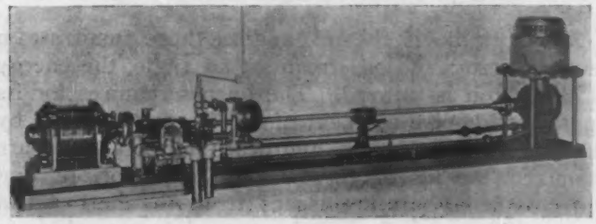
Fig 2 LONGITUDINAL SECTION
A Orifice for Oil Supply Pipe
B Orifice for Steam Supply Pipe
C Mixing or atomizing chamber
D Oil Inlet Duct
E Equalizing Steam Chamber
F Steam Entrance
G H I Steam Ducts
J Set Screw holding Plate
K Removable steel plates
X By Pass or Blowout Valve
Fig. 3.
OIL
STEAM
In ordering give this length (3-3) Also Give width of Fire Box and H.P.
VIEW WITH BOTTOM REMOVED

THE INSIDE MIXER TYPE OF BURNER

In burners of this type the steam and oil come into contact and the oil is atomized inside the burner itself. The mixture then issues from the burner tip ready for combustion. The Hammel burner shown in the illustration above is of this type.

readily replaced in case of wear or if it is desired to alter the form of the flame.

An Example of the Mechanical Atomizer.—As an illustration of one of the many interesting types of burners that produce atomization by the mechanical process, let us consider for the moment the rotary burner of the Fess System Company. The mechanism that accomplishes the atomization is operated by a small electric motor as shown of ¼ to ⅓ h.p. The motor operates a rotary pump through a worm gear.

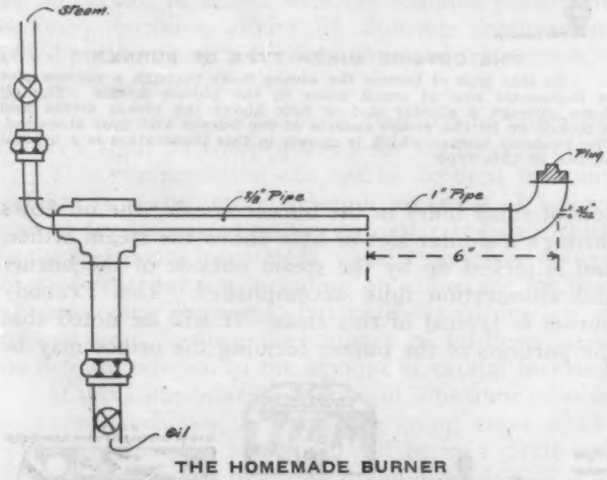


A MECHANICAL TYPE OF ATOMIZER

Many types of mechanical atomizer may be seen upon the market in which various physical laws are made use of to accomplish atomization. In the mechanism shown in the illustration, which is that of the Fess System Company, the burner is caused to rotate at a sufficient speed to thoroughly atomize the oil by centrifugal force. By the proper admission of air a smokeless flame is produced, equally distributed throughout the fire-box.

This pump brings the crude oil from the storage tank and applies it to the burner, which is placed in the center of the fire box. The burner rotates at a sufficient speed to thoroughly atomize the oil by centrifugal force and by the proper admission of air a smokeless flame is produced equally distributed throughout the fire box.

The Home-Made Type of Burner.—Patented oil burners are practically unknown in the oil fields. Every operator makes his own burner out of ordinary fittings. The construction varies somewhat depending upon the ideas of the maker and the quality of oil burned. The general principle of the burner is illustrated in the sketch. No oil pumps are used, the



THE HOMEMADE BURNER

This ingenious type of homemade burner is a product of the oil fields. The impact of the jet of steam which issues from the inner pipe produces a back pressure on the oil issuing from the annular space between the pipes, thus making the burner self-regulating to a great extent.

oil being supplied by gravity from a tank set from 6 to 10 feet above the ground.

An important peculiarity of the burner is that it is self-regulating to a great extent. The impact of the jet of steam issuing from the inner pipe produces a back pressure on the oil issuing from the annular space between the pipes. If the steam valve is adjusted for good atomization any increase of the steam pressure will cause more steam to flow through the inner pipe. This will increase the back pressure at the tip and choke back the oil coming from the annular space, thus decreasing the fire.

If, on the other hand, the steam pressure drops, the back pressure at the tip is decreased, more oil will flow and the fire will be increased.

This type of burner is sensitive to variations in steam pressure. As the steam pressure goes up, the fire is cut down until a point is reached at which the fire becomes spasmodic or "bucks."

While this self regulating feature helps to maintain constant pressure on the boiler, it is not economical because as the steam pressure increases, thus diminishing the quantity of oil, the quantity of steam increases with the pressure. Thus, the less oil is burned the more steam is used for atomizing, which is just the opposite of what it should be.

Another peculiarity of the burner is that it will begin to atomize when the steam pressure is less than a pound above atmosphere. As soon as a sizzle is heard issuing from the steam pipe, the burner will make a fairly good fire.

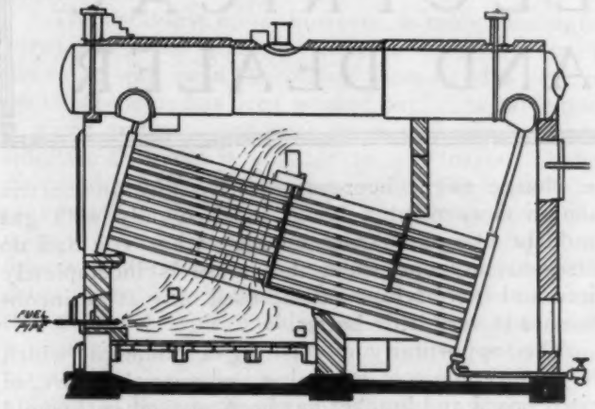
Quantity of Steam Required.—The regulation of the quantity of steam used for atomizing the oil is a matter of very great importance, as if more steam is used than is actually needed there is not only a waste of the excess quantity of steam but also there is a loss of the heat required to raise the temperature of this extra steam up to the temperature of the escaping gases. With careless operation the quantity of steam supplied to the burners sometimes amounts to as much as 5% of the total steam generated by the boiler, whereas with proper care in operating this quantity can be reduced below 1%. A simple way to adjust the quantity of steam supplied is to gradually close down on the steam valve to the burner until drops of oil fall on the furnace floor. The drops burn and scintillate and can be readily seen and this scintillation indicates that there is not sufficient steam to atomize the oil. As soon as this point is reached the steam valve should be opened just enough to stop the scintillating action. This method will insure sufficient steam being supplied but no more than necessary.

The quantity of steam supplied to the burner bears an important relation to the furnace arrangement and the air supply, as both the shape and character of the flame change when the quantity of steam is varied. With too much steam an intense white flame is produced which has a tendency to cause localization of heat on the brickwork or the tubes. With the proper amount of steam and correct air regulation a soft orange-colored flame is produced which fills out the furnace and has a good deal the appearance of a flame from a soft coal fire. This flame will sometimes appear smoky in the furnace but the smoke disappears before the gases reach the stack. It is, therefore, unnecessary to have an absolutely clear flame in the furnace.

It is not a difficult matter for an experienced man in charge of the boiler plant to properly adjust the

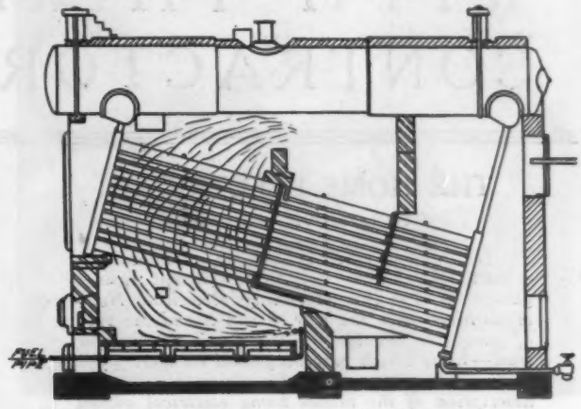
steam and oil valves so as to get the right amount of steam. It is often very difficult, however, to get the firemen to use sufficient care in making these adjustments. A simple method of preventing too much steam being used for atomizing where boilers are operated at a fairly steady load is to provide a disc with a small hole in it, in the steam to burner line. This disc restricts the quantity of steam that can pass through to the burner. The size of the hole in the disc depends on the steam pressure used and on the capacity required from the boiler and must be determined by experiment. In a plant using 200 lb. steam pressure a hole 5/16 in. in diameter has been found large enough to supply all the atomizing steam required for a 600 h.p. boiler. A by-pass should be provided on the steam line so as to pass steam around the disc in case it is found necessary to force the boiler at any time above its normal capacity. By providing the by-pass with a valve having a rising steam it can be seen at a glance whether the valve is open or shut.

The quantity of steam required for atomizing depends largely on the temperature of the oil. The hotter the oil the less steam is required. In central station work the oil should be heated up to about 180° Fahrenheit on the pressure side of the pumps, the pressure carried running from 40 to 60 lbs.



B. & W. BOILER WITH FRONT SHOT OIL BURNER

With this furnace arrangement the flame does not fill out the first pass, so the front end of the tubes do not do their share of the work.

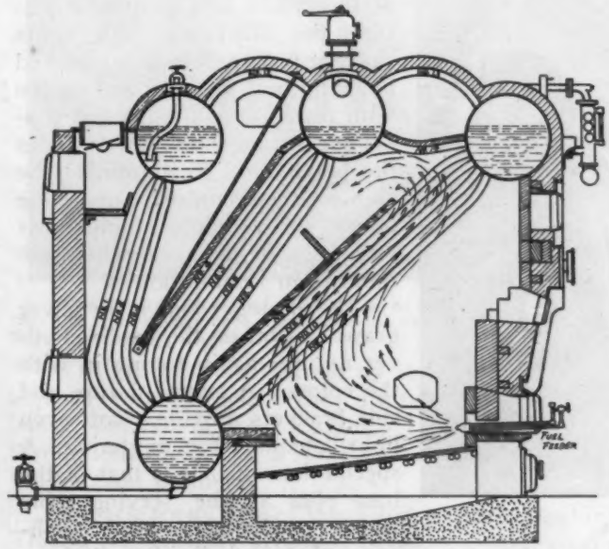


B. & W. BOILER WITH BACK SHOT OIL BURNER

With this furnace arrangement the gases have ample volume in which to burn, and they distribute themselves over the entire first pass, resulting in efficient operation.

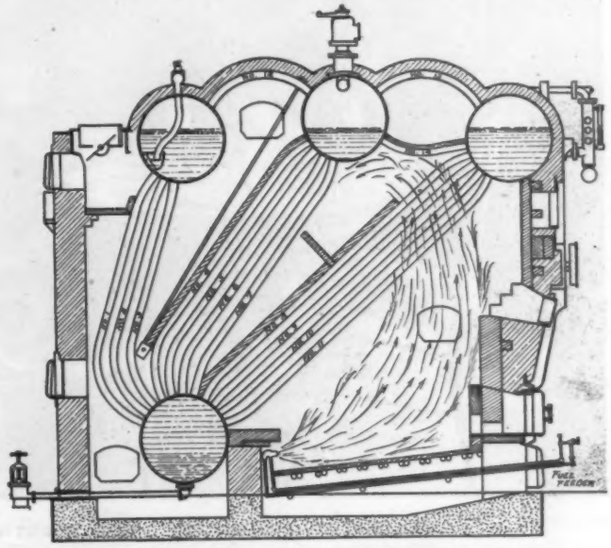
Number of Men Required for Operating Oil Fired Boilers.—The number of men required to operate boilers fired by oil is much less than the number required to operate a coal burning plant. In an oil burning central station a fireman can operate six or seven large boilers having three oil burners each, and in addition attend to the feeding of the boilers with water. In other words, a plant having 26 or 28 boilers would require only four firemen on a watch besides a man to look after the feed pumps, oil pumps and keep records of oil consumption, temperatures, etc.

Caution.—In operating oil fired boilers it is extremely important to avoid any accumulation of gas in the boiler setting, consequently, no oil should be allowed to get into the furnace unless there is a fire to ignite it and no more oil should be fed into the furnace than can be burned with the available quantity of air and atomizing steam. Any accumulation of gases inside the settings is liable to cause explosions which may result in serious damage.



STIRLING BOILER WITH FRONT SHOT OIL BURNER

With this furnace arrangement the tubes are swept by the hot gases for their full length, but this advantage is gained at the expense of furnace efficiency owing to the smaller volume available as combustion chamber.



STIRLING BOILER WITH BACK SHOT OIL BURNER

This furnace arrangement gives a splendid furnace with large volume, but the gases come in contact with only about one-third of the tubes in the front bank, so that the effectiveness of the heating surface is impaired.

WITH THE ELECTRICAL CONTRACTOR AND DEALER

THE HOME ELECTRICAL

BY CLOTILDE GRUNSKY

(It is much easier to sell an automobile to a man who knows how to run it and owns a garage. And so it is with things electrical. Numerous hints as to the way to run it and the type of garage to provide for the new percolator or iron—hints which may be passed on with profit to the customer—are to be obtained from this description of the model home electrical owned by D. E. Harris, vice-president of the Pacific States Electric Company.—The Editor.)

The great difficulty in selling electrical appliances is that the homes of the purchasers are not fitted up to receive them. The electric toaster which was received for a Christmas present is never used because the cord was so unsightly at the breakfast table—and it was such a nuisance to have to unscrew a bulb each time. So naturally enough the electric percolator is never bought and the electric chafing dish which looks so attractive is decided to be more nuisance than it is worth.

To the fact that people have not learned to use electrical conveniences is blamed the inadequacy of house wiring and the sparseness of base plugs and special conveniences—with much greater propriety the charge might be reversed. To buy an electric vacuum cleaner for a home supplied only with gas would be like purchasing a buggy when you had no horse—to buy one when the house is incompletely wired and the machine can be used only at an inconvenience is very little better.

The opportunity of visiting a home in which every convenience of base plug and special fixture, of switch board and bracket has been worked out, would prove a revelation to any prospective owner of a 'house electrical'—it should prove a revelation to a contractor-dealer as well. For here he learns how he can best fit out a home so that a customer will profit to the greatest extent by the use of the electrical conveniences he has to sell. He can learn what suggestion to offer with the purchase for its better use, that the satisfied purchaser may return again. Such a home is that of D. E. Harris of the Pacific States Electric Company located on 17th Avenue, San Francisco.

An idea of the care with which the details of wiring have been planned can be obtained from the fact that in this 8-room house there are 14 base plugs and 31 switches.

The parlor is planned with special attention to the fixtures. Center bowl, side brackets and table reading lamp are all arranged with separate switches, so that the light may be varied at will to obtain a general illumination, or a concentration of the light where desired. The toning of the colors is a particular feature, the bowl and side lights shading from amber to cream and blending both in color and design with rug and wall paper. An ingenious arrangement here utilizes the porch light to illuminate the stained glass landscape over the piano, the window shining out with a soft radiance when the room is in semi-darkness.

The dining room is in silver grays and blues, the oxidized silver fixtures again toning in with the colors. A center fixture and side brackets provide a soft even light, adequate but unglaring. A special convenience is that of the base plug at the serving table which permits of the use of appliances there, wholly distinct from the center table. The dining table itself is provided with a floor plug,

TABLE SERVICE FOR THE HOME ELECTRICAL

Note how the table sockets do away with the awkwardness of cords and overhead connections. The electric toaster, chafing dish and percolator are here a real convenience.

so arranged that it is quite flush with the floor and permits of the use of the room for dancing without inconvenience.

The breakfast room, however, is more thoroughly wired. It is not necessary here to clear the room in the same way as in the dining room—and a very ingenious scheme has been worked out. The table itself is wired and provided with three plugs on its under side, which make it possible to use toaster, chafing dish and percolator simultaneously. The whole arrangement is distinct from the lighting system and it is quite unnecessary to unscrew bulbs or scrape one's fingers on the shade in tightening the connection. The cords are entirely inconspicuous—and for the first time the electrical table cooking devices have become a convenience and not merely a rather entertaining plaything.

An artistic arrangement of glass sliding doors makes it possible to obtain a vista of the house, thus getting the full effect of the lighting scheme.

The special feature of the kitchen is the ironing board and iron. A small cupboard in the wall proves to be a concealed ironing board when unfolded. Above it is a shelf for the iron and stand. Immediately alongside of the board is the plug — not a screw socket but a plug which can be handled by a simple insertion. The Bryant switch is used here, the current being turned by a simple push button which lights at the same time a small pilot light. It is thus impossible to leave your iron on unwittingly—and quite unnecessary to feel of its surface at intervals with wet finger to see if you have pressed the correct button. An electric range is soon to be installed, thus completing the kitchen outfit.

The Electric Washing machine is so conveniently arranged that the housekeeper need only guide the articles from one operation to the other. A child can manage all the family wash.

The ground floor is fitted up as a den, with lights adjacent to tables where they are needed and conveniently situated in store closets. Here as elsewhere throughout the house, a special socket is provided for the vacuum cleaner.

A back room houses the Thor washing machine. This is conveniently arranged between a shelf on one side on which a basket can be placed and the tubs on the other. The clothes are put to soak on Sunday night, and placed in the washer before breakfast Monday morning. Attachments of hot and cold water

The pilot light switch plug makes it impossible to leave the iron burning by mistake.—Note how the plug is arranged to best advantage alongside the folding board.

make it possible to regulate the temperature of the water used—and the machine is set in motion. By the time breakfast is over the clothes are washed—and the only duty remaining is to lift the pieces one by one to the electric wringer which is now turned on. This conveys the clothes to the rinse water, a new set is started in the washer, the lid closed and the articles again put through the wringer, now reversed, from the rinse water to the waiting basket. With the appliances thus conveniently and compactly arranged, it is possible for a child to handle them.

The upstairs floor is again a model of convenience. Brackets at the bureaus, center fixtures with separate switches, bedside reading lamps entirely distinct from the other lighting system, desk lamps and specially designed fixtures carry out the carefully planned scheme. A special portable fixture by the bedside is arranged somewhat on the order of an invalid's table, making it possible to swing the light over the bed to any point desired. Base plugs alongside the bed permit the use of bed pads or other conveniences for heating hot water, etc.—without the use of overhead fixture.

The bathroom has a center light which illuminates the room brightly and evenly without shadows. A special base plug here makes it possible to use an electric heater when desired.

Everywhere appliances and wiring schemes combine for beauty and convenience. There is no sense of cords or fixtures—merely of general well being and the acme of modern comfort.

Not one of these devices is strictly new, but the application has been studied out until it nears the point of perfection. And after all, it is the success of the ultimate installation rather than the mere appliance as demonstrated in a store which the purchaser is buying — it is that which the dealer must sell. The difference between electrical appliances as so used and the awkward fittings of the usual home is so marked that no one who has ever seen the example could fail to appreciate the value of ingenuity of wiring as a selling argument. The purchaser is not going to know these things for himself — he must be told them—and it becomes the duty of the contractor-dealer to know how to do it himself and to spread that information to his own great good,

Before
This merchant said his lighting was as good as any in town and he was going to leave it as it was — until he saw this photograph.

SELLING BY NIGHT

BY FRANK D. FAGAN

(The show window is the silent salesman of the merchant. How the central station can help the consumer to make proper use of his electrical lighting in store and home is pointed out in this interesting article which formed part of a paper given before the recent convention of the Northwest Electric Light & Power Association at Spokane. The author is western salesmanager of the Edison Lamp Works.—The Editor.)

There were at one time in the harbor of New York over 700 ships carrying whale oil into the city for lighting purposes. The oil dip was followed by the tallow candle. The coal oil lamp came next and in 1877 scientists from all over the world were working on the incandescent lamp.

It was about this time that Thomas A. Edison took up this work. He paid no attention to any other scientist and no one agreed with him. He worked for two years on the manufacture of the incandescent lamp, using over 6,000 pieces of material, grasses, herbs, roots, red hair—everything that he could get to use as filaments. Finally he made his first filament from a piece of sewing thread and, on October 21, 1879, Mr. Edison gave to the world the first incandescent lamp.

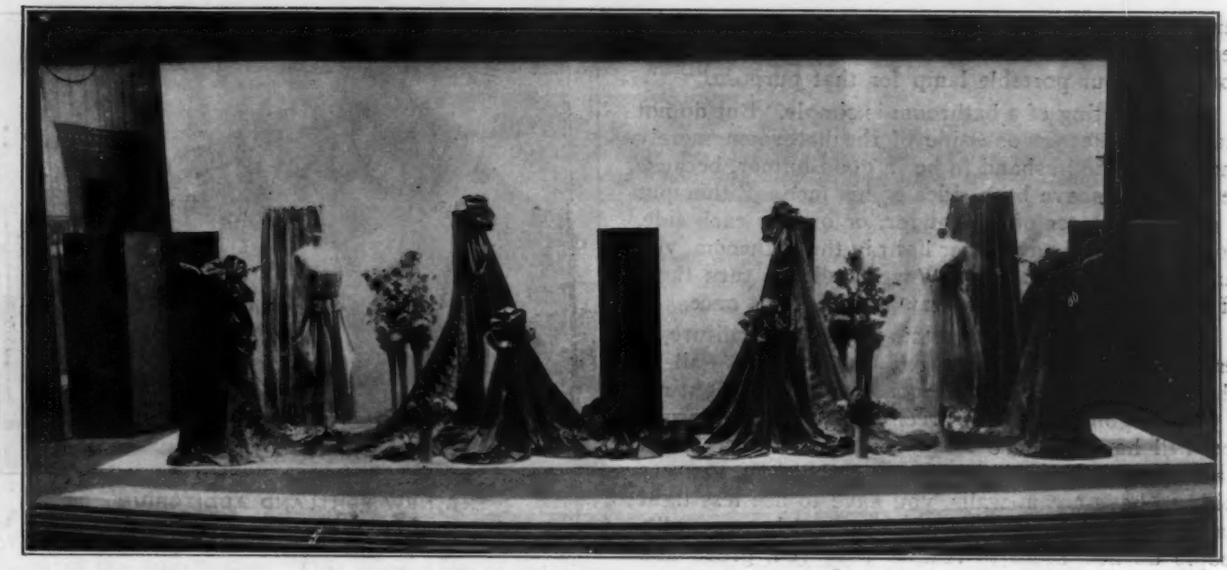
From this first lamp which required seven watts to produce a candle power, he has steadily improved his product through the bamboo filament, the cellulose project, the gem lamp to the tungsten lamp of today.

The change in lighting systems has revolutionized our homes and our business methods. Today efficient lighting of the streets means that the day is lengthened for the merchant. His potential customers do not hide away in their houses with the dark but pass up and down the streets in front of his establishment—to be made into actual purchasers by the displays in his electrically lighted show windows.

Where you have good street lighting you must have the very best of window lighting or you lose all the good effects of your windows. What is your window for? You have your window for one object only; and that is to sell to your customers when the store is closed. In other words, it is your silent salesman. If that salesman is not properly groomed and properly arrayed, you cannot expect to sell any goods. Ten years ago you had to be satisfied with carbon lamps—today you can come so near to daylight that it is practically impossible for the consumer to distinguish between daylight and the incandescent light.

The greatest mistake made in lighting a show window is to place the light where it can be seen. You must conceal the light. Do not forget that the merchant is not selling electrical fixtures or lamps, he is trying to sell goods. It is true that human beings are just like flies, they are attracted by light; they are attracted by a fire, a light at any distance. But there is a limit to how close they can get, unless the effect is pleasing to the eye.

In the lighting of a store, your lamps should be placed so high that they give good distribution of light, but at no time are offensive to your customers. If your store is not brightly lighted they cannot see your goods or display. If you were running a fire sale, of course—and you really had a fire—and wanted to get rid of a lot of fire goods, I would say cut out about half of your lights, because you do not want the customers to see the goods. But that is different—I am talking about a place where you want them to see the goods. Do not spoil the goods and spoil the effects, however, by shooting the light in the eyes of your customers. The old method was to get the fixtures just as close to the floor as they would stand, and fill the fixture full of lamps. Now it is recognized



And After

The same window properly lighted. It seems incredible, but this is accomplished with the same amount of electricity.

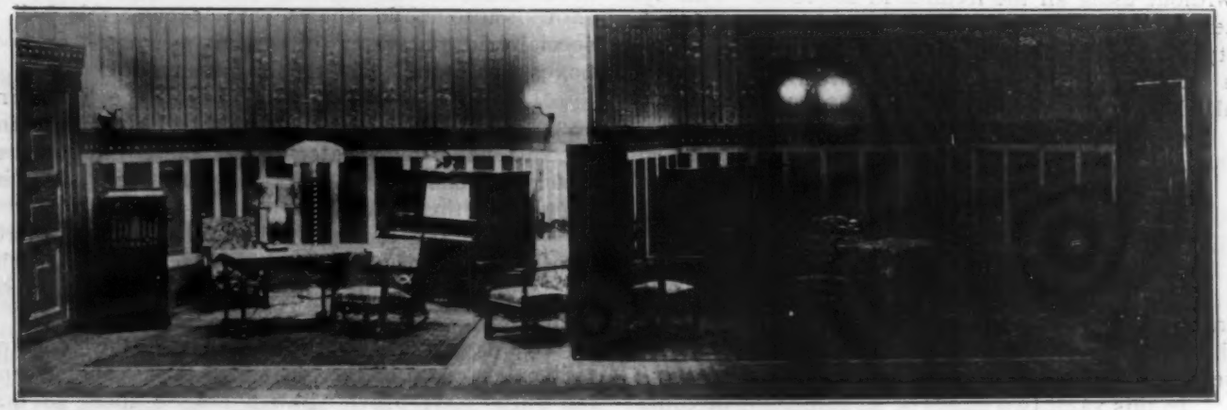
that the best practice is to place the lamps just as high as possible, but properly spaced so as to distribute the light evenly over the goods that you have on display.

Some merchants try to light a green living room in a furniture store, or a red living room, with the same light that they try to light white goods. It cannot be done. You will never get results with red or green carpets or goods on display, unless you increase the light in your window. Another caution as to the use of blue lamps. This lighting is the nearest approach to daylight yet produced and colored goods are here seen for the first time in their natural hues—but a larger sized lamp must be used in every case than with the clear glass. It takes more current to give that daylight effect on account of the density of the glass.

Here is a very important thing for the hardware merchant or the man selling cut glass or diamonds: Don't put frosted lamps in your show case to light cut glass or diamonds. Have clear lamps. They need not be placed so that they will shine in the eyes of your customers, but if you frost your globes or lamps, you spoil the sparkle both of the diamonds and of the cut glass.

The same principle applies in the home as in the store. The lamps are placed high so as not to be bleary and hard on the eye. One of the problems today in households is the question of what to do with dining room domes. When the people sit at the dining room table, they are trying to see the guests at the other end of the table—but usually they are looking directly into the dome fixture, with the light shining into their eyes. Now this can easily be corrected by the use of a piece of silk underneath the dome. By the use of cream colored silks—or almost any other color you like but white—the light is softly diffused and gives a very pleasing illumination. The glare which comes from any dome fixture is eliminated.

The lighting of the bedroom is another question on which everybody has their own ideas. In any case, however, the lady should have brackets at her dresser. For the general lighting of the room, the



Improved by Modern Methods

Imagine yourself trying to play the piano in this second room. The same amount of electricity is used in both of these rooms, but note how the portable fixtures bring the light to the points where it is to be used.

semi-indirect system is more popular than direct for bedrooms. If you want to read in bed, then, of course, you have your portable lamp for that purpose.

The lighting of a bathroom is simple. But do not place a bracket on one side of the bathroom merely and expect the husband to be in good humor, because he wants to shave both sides of his face. Either put it over the center of the mirror, or one on each side. You do not need any center light in the bathroom, you can use the brackets just as well and can turn them off by hand if you do not want to use all at once.

Every home has a certain style of furniture, a certain style of carpets, rugs, and draperies—all of which have to be taken into consideration in lighting. If you are going to have a green carpet or a red carpet, you will have to have 25 or 50 per cent more light than if you have a light brown carpet. If you are going to have cream walls, you have to use less light than if you have red walls or green and brown walls. People do not seem to realize that red, green and black carpets and walls make all the difference in the world in the lighting of the home.

The principal thing to bear in mind in the lighting of the home is that you want light at any particular spot in the room when you want to use that particular spot, whether it is the piano, or the library table, or the phonograph, or the chair where you sit and read. You need not light up the entire room. You can arrange separate portables. If you prefer to have the entire room lighted so that you can see just as well in one corner as another, there are, of course, other ways of handling the problem.

The semi-indirect, or bowl fixture secures a general distribution of light all over the room, using the ceiling as a reflector. With this system you have a very flat picture—with practically no sign of a shadow.

The system which I consider really the very best, however, is not as much used today as I think it will be within the next few years. By removing the center light altogether and using brackets and portables the easiest and most logical system of lighting can be achieved, one that you can control. You can clear out the room, take every fixture out and still have your room lighted up. If you wish to use a light at the reading table, or one over in the corner or at the piano, you can do that without any difficulty and without using all the fixtures in the room. This system requires in this case the same amount of electricity as this one with the carbon lamps. That may seem a bit far-fetched, looking at the two rooms, but it is absolutely true.

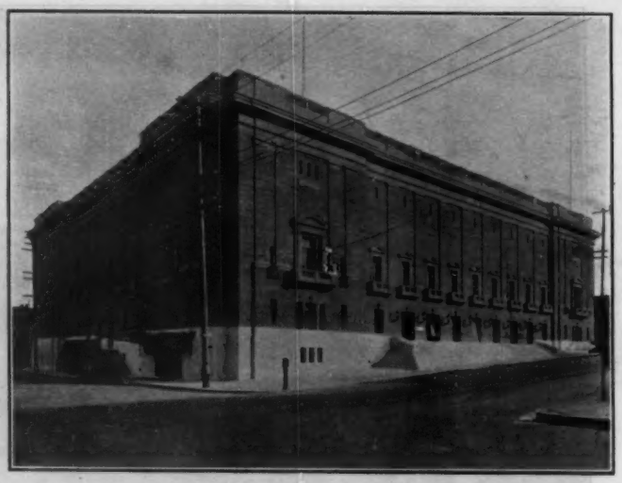
WIRING FEATURES OF THE PORTLAND AUDITORIUM

BY F. D. WEBER

Services

On the sub-basement level a reinforced concrete transformer vault has been constructed, cut off from the balance of the building by a standard fire door and ventilated to the outside atmosphere.

In this vault two banks of oil insulated, air cooled transformers are located, which furnish 3-wire single phase, 115-230 volt service for the general lighting system and 3-wire, 3-phase, 220-volt service for power.



THE NEW PORTLAND AUDITORIUM

The contractor must watch each new achievement of wiring to keep his methods and equipment up to date.

Also, a 3-wire, 110-220-volt direct current service is brought through this vault for supplying some of the arc pockets on the stage, the motion picture booth and receptacles.

Main Service Switchboard

The main service switchboard is located in a separate room which is adjacent to the transformer vault. The only feature out of the ordinary in this board is the use of the automatic emergency switch in the exit light service. Under normal conditions this switch is held in a position so that the service for the emergency lights is taken from the main one-phase lighting service ahead of the main circuit breaker, but if something should interrupt this main service, an electric release causes this switch to operate and automatically cut in another service from the other public service utility which supplies power to the building.

Hinged footlights were installed so that they could be closed flush with the stage, but they are not a success and will be changed. The dressing rooms have a curling iron outlet in each, placed two on a circuit. The lights in all the dressing rooms are protected with heavy wire cages.

The Main Exhibition Hall

In order to avoid the unsightly appearance of temporary wiring which must be done when land shows, automobile shows, etc., occupy this hall, a special gridiron system of conduit and cast iron floor boxes was installed in the basement floor.

The boxes are 16 x 16 x 6 inches, the lids being secured in place by brass screws and steam packing used to make them waterproof. The cover is ribbed and heavy enough for trucks to pass over. No wire is pulled in these raceways.

Also in the ceiling of this hall 6 cabinets have been located for use with temporary wiring in the halls above and in this hall. No wire is pulled in these cabinets.

The conduits from the raceways in the floor and ceiling terminate in the gutters of these cabinets and the gutters are provided with hinged doors so that temporary connections can easily be made. Several extra switches are provided in these panels to be used in case of emergency.

CO-OPERATION IN THE ELECTRICAL INDUSTRY

BY O. B. COLDWELL

(The contractor, dealer and central station find a common interest in increasing electrical business, the moral being that it is only as they help each other that they help themselves. The author, who is superintendent of the Portland Railway, Light and Power Company, has long stood for co-operation in the electrical industry. An article by him covering another phase of this subject appeared in the Journal of Electricity for October 1, 1917.—The Editor.)

This plan is being worked out satisfactorily in some Pacific Coast cities, and provides a direct or concrete incentive for the dealer to assist in boosting the electric range.

It seems to be most satisfactory to the prospect to be quoted a price on the range installed and ready for use, thus avoiding for them the confusion and complications of getting costs on the wiring up of the range. In other words, the installation cost or an average of such costs, is included in the quotation on the range, the central station absorbing the actual cost of the installation. This wiring job of installing the range is, therefore, under the control of the central station and should, wherever possible, be turned over to some responsible wiring contractor by the central station, as such work is distinctly in the field of the contractor and as long as his charge for the work is within reason and the quality of work satisfactory, he is entitled to the job.

This idea of quoting an installed price might also well be applied to water and air heaters and other similar devices where special wiring is required.

An important field for co-operative effort on the part of contractor and central station lies in the wiring of new buildings. The inclusion of special circuits for the larger heating and cooking devices, convenience outlets, baseboard and floor plugs at suitable locations, convenience lighting outlets, etc., adds comparatively little to the cost of a new building and the joint efforts of the contractor and central station should influence the architect to include such items in his wiring specifications. A systematic follow-up system on the contemplated construction of all new buildings should be carried out for this purpose. Intelligent and tactful co-operation along this line is usually welcomed by the architect and the results of such practice are obviously to the direct advantage of both contractor and central station, to say nothing of the consumer.

Mr. A. S. Moody of the General Electric Company covers this idea in the following:

"It should be the aim of both the contractor and central station to work with each other on general supplies and wiring. They should, of course, be boosting the electrical business and the only way to succeed in that is to boost each other's business. For example, every residence should have a number of baseboard outlets. They are a matter of permanent convenience to the householder acquired at little additional expense when the house is wired, but difficult of installation after the house is completed. Their installation undoubtedly means additional revenue to the central station by promoting the use of household utensils, vacuum cleaners, etc. Their installation also means additional work for the electrical contractor and he is anxious to put them in. As a matter of fact, however, the majority of residences have no baseboard outlets and a very small percentage have them, except the one in the kitchen for a flatiron. The reason the contractor cannot put them in every house, as he would like to do, is because of competition with his fellow contractor who will quote lower figures leaving them out. The remedy, I believe, is co-operation between contractor and central station with the architect in getting such conveniences specified in the wiring specifications. To do this logically the architect himself should first be convinced of their usefulness and necessity, so that he will feel his work is incomplete if they are not specified."

Mr. F. C. Green, a prominent Portland contractor and dealer, refers to this point as follows:

"The contractor dealer's object should be to serve, and his service should be prompt, intelligent and reasonable in price. The contractor often acts as the medium through which a large portion of the public obtain their knowledge of electrical affairs. The architect very frequently relies upon the contractor for detail in his electrical specification and many of the newer devices, although personally advertised by the manufacturer representatives, are not favorably considered until recommended by the contractor."

It is of importance that the wiring specifications specifically include the desired capacity and outlets. Loosely drawn wiring specifications offer too much of a temptation to the over-zealous contractor to "shave" on material and labor to the disadvantage of all other parties concerned, and in the long run to his own disadvantage as well.

In the wiring of old buildings, the combined efforts of the contractor and central station must usually be directed toward the consumer himself, especially in the case of residence work.

On the Pacific Coast the field for the wiring of old buildings is much more limited than in the East, but there are even here a surprisingly large number of prospects in this class.

With the proper degree of effort expended by the contractors in working up business along these lines, there is no occasion for the central station to do this class of work. It can, however, and most central stations do, take an active part in the solicitation of this business by means of wiring campaigns, offers of installment propositions, premiums, etc., the contracts for the wiring being turned over to responsible contractors on some flat rate or percentage basis previously agreed upon, the central station usually carrying the financial burden of the installment form of payment, the contractor receiving full payment from the central station upon the satisfactory completion of the work.

The harmonious operation of this plan involves the highest degree of co-operation between contractors and central stations. That it can and has been successfully carried out is demonstrated by the experience of a number of companies here on the Pacific Coast, including that of the company which I represent. It has been our consistent policy for a num-

ber of years to leave the wiring of new and old buildings, including range wiring, to the contractor, not only in Portland but in the smaller cities and towns and rural communities served by our company. We have, however, demanded from the contractors fair treatment for ourselves and our consumers in the form of good workmanship, reasonable prices and proper observance of the company's wiring requirements as to service entrance meter loops, etc. With few exceptions, the contractors have satisfactorily met these conditions and as long as they continue to do so we are well satisfied to continue our present policy of full co-operation with them.

Another field for effective joint effort by contractor and central station exists in the assistance of the architect and consumer in the proper layout and selection of the lighting equipment in store, shop and home. Up to a very few years ago, that phase of the industry now known as "illuminating engineering" was almost completely neglected. Remarkable advancement has recently been made along this line by central stations and architects, and in some cases by dealers, particularly those specializing in electric and gas lighting fixtures. There still remains, however, a large number of contractors and dealers who have given this subject very little earnest thought. Most of the larger central stations now have on their staff an illuminating engineer who is more than willing to assist contractors in their problems of this kind. In view of the availability of this service, as well as that now furnished by the manufacturers of lighting equipment, and in view of the dealers' and contractors' exceptional opportunities to influence the design of lighting installations, especially in remodeled stores, there is small excuse for a continuation of the indifferent attitude above referred to. The sale and installation of modern lighting fixtures and lamps involves not merely a merchandising transaction but also the sale of a service in the form of intelligent advice and recommendations in the selection, location and operation of lighting equipment. On this point, Mr. S. M. Kennedy of the Southern California Edison Company comments as follows:

"There should be active co-operation existing in the larger cities, between the electrical contractors and dealers and the central station. This can be brought about to a considerable degree through the closer contact that membership in the Northwest Association, for instance, permits, and the friendships, discussion and policies leading out of it."

"The central station should have a definite mark in mind, below which the sales of apparatus and appliances should not be permitted to fall, and this bogy should be based on kilowatts connected rather than number of appliances sold. The mark should be sufficiently high to require the efforts of both the central station sales force and the contractors and dealers to reach it. The central station's efforts should be confined to load building rather than merchandising, at least to the extent of selling moderately priced appliances consuming 500 watts or over, selling around $5 to $7. Inquiries for washing machines, vacuum cleaners and articles selling at high prices, carrying a good merchandising profit with small consumption should be turned over to the dealers."

"The central station should maintain a force of house-to-house salesmen to create and stimulate demand. Also lend advertising aid. Send dealers' folders out with bills. Refer to contractors' inquiries for wiring and pursue a live-and-let-live policy, lending active co-operation, at the same time leading the way and not turning over altogether to others the vital matter of load building. Practically all of the work that the contractor does and all of the sales that the dealer makes is to the benefit of the central station and they should be offered every encouragement, not, however, to the extent of turning the entire load building business over to them. They are in a sense auxiliary, or at least going through an educational process from which they may in time graduate as full fledged load builders, capable of taking this responsibility off of the central station's shoulders. But that is only a dream as yet, and it is a long stretch from the kindergarten and primary to the college graduation. During this period every needed help should be supplied and those who do not know how to earn their way through school should be guided and assisted."

In the case of power installations, similar co-operation should exist between the dealer and contractor and the industrial engineering department of the central station.

One more subject presents itself in this discussion, that is the matter of advertising. Thousands of dollars are being spent each year by manufacturers of electrical appliances in advertising campaigns in national periodicals and in attractive catalogues, folders, etc., covering almost every possible phase of the advertising game.

No small amount of money is also being expended by central stations, dealers and contractors in local advertising.

The point I want to bring to your attention here is: has this local advertising been correlated and co-ordinated to the best advantage and has it always been timed and designed to "tie in" with the national advertising campaigns of the manufacturers? Are we properly co-operating with the advertising efforts of the manufacturer and are we boosting the game as we should by proper co-operation in our own local advertising? Why not a few more of these "Electrical Pages" in our local papers, participated in jointly by dealers, contractors and central stations during Electrical Week last December? This subject is well worthy of the organized thought and action of associations such as we have here.

As I stated at the beginning of this paper, the title presented to me for discussion is one which is not susceptible to absolutely infinite and specific treatment. The personnel of dealers, contractors and central station representatives is largely a factor in the shaping of the co-operative relations between these two elements of the industry. I have, therefore, in discussing some of the more specific details of co-operative effort, been obliged to assume the existence of satisfactory local conditions as a basis for the plans discussed. I trust that the points here brought out, together with their later discussion, will assist, in at least some small way, in furthering the amicable relations which for the most part now exist between the electrical contractor and dealer and the central station.

NEW BUSINESS BUILDING METHODS

BY A. H. HALLORAN

(Too much emphasis cannot be placed on the necessity for the electrical contractor's understanding what constitutes overhead expense and what an important part it plays in his business success. Hence this article should appeal not only to the contractor-dealer but also to those most interested in his welfare, the jobber and the central station.—The Editor.)

THE DANGER OF UNDERRATING OVERHEAD EXPENSE

Nine-tenths of the electrical contractor's troubles are due to underrating something. He underrates the cost of labor and material in estimating a job. He underrates the Underwriters' requirements when the job is inspected. But above all else, he underrates the importance of overhead expense as an element in his business success. He forgets because he doesn't think it worth while to remember. Edward N. Hurley has said that a lack of understanding and appreciation of overhead is responsible for most business failures.

The overhead expense of any business is all money paid out which is not directly chargeable to any job or sale. Hence it is frequently known as indirect expense. It includes such a wide range of costs that the due proportion chargeable to each job or sale is figured as a percentage. This percentage is the average ratio of operating expenses to net sales.

If a contractor-dealer did a business of $22,500 during 1916 and his books showed that he had made $2500 over and above all expenses, including $14,000 paid out for labor, material and other items which had been directly charged to each job or sale his overhead expense for the year would have been $22,500—2500—14,000=$6000, or 26⅔ per cent, i. e. the ratio of $6000 operating expenses to $22,500 net sales was 26⅔ per cent overhead.

If his overhead expenses during 1917 are the same as they were during 1916 his contract estimates or the selling price of his goods should include not only his cost of labor and material, as well as his profit, but also the 26⅔ per cent overhead. If his labor and material cost were 60 per cent of the 100 per cent selling price, his overhead 26⅔ per cent, his profit would have been 13⅓ per cent. The method of figuring these matters was fully explained by the author in the Oct. 15, 1917 issue of this journal.

A contractor-dealer's overhead consists of four divisions,—general overhead, office overhead, shop overhead and selling expense. Each of these is subdivided into detailed items as shown in the form on the next page.

It will be noted that this list is sufficient to care for the needs of a concern doing a large business. Smaller concerns may omit some items or where one person does the work of several the salary should be divided in accordance with the amount of time spent on each kind of work. Too much emphasis cannot be placed upon the necessity for carefully considering each item.

The owner's salary, particularly, should be allowed for independently of the profit that may be made. Salary is not profit, for profit does not exist until a job has been finished, charged and paid for. A working owner is entitled to at least a journeyman's wage.

Rent should be charged against a business even though the proprietor owns his place of business. This charge should be the same as could be obtained by renting the place to some one else.

Public utilities, light, heat, power and water, are a necessary part of the overhead. Every electric shop should be lighted during the evening to call attention to window and store displays. Even if the store is not kept open at night do not forget the many evenings you spend at home figuring estimates or making out bills.

Insurance, taxes and license fees are purely a business and not a personal matter. Many big concerns insure against the death of their head men just as they insure against fire.

Losses and depreciation should not be overlooked. Bad accounts are occasionally unavoidable, you are bound to lose money on some contracts, market fluctuations cannot always be foreseen, and depreciation is inevitable. Due allowance should be made for each on the basis of your past records.

Delivery costs are especially liable to be overlooked. If you drive your own horse or automobile, the next time that you get up at five o'clock in the morning to do a hostler's work or tinker with your machine remember that you are working nearly 70 hours instead of 48 hours a week and employing a $5 a day man to do a $10 a week boy's work.

Strikes and time lost by men on jobs are a contingency that should be regularly provided for. The experience of successful men demonstrates that three per cent is none too much to allow for this possibility. Even if you get by this year you may be hit for six per cent next year.

Interest on working capital and investment, particularly, should not be forgotten. Figure at least as much as the savings bank would allow for the same money you have invested in stock and equipment.

Bookkeeping and stenographic work is a legitimate overhead expense. If your wife or family helps out on this work pay them at least what you would pay some one else. It is enough to sacrifice your own life for your business without sacrificing your family as well.

Finally, don't forget that it is the little things that count. A large number of apparently insignificant items unaccounted for may make all the difference between profit and loss. Don't underrate or overlook any item in your overhead.

FORM FOR FIGURING OVERHEAD EXPENSE

General Overhead Expense

Salaries
- Officers
- General Manager

Insurance Premiums

Fire
- Stock Supplies
- Furniture
- Tools and Instruments
- Buildings

Life and Accident
- Lives of owners or partners

Liability
- Employees
- Bonds, Surety
  - Bookkeeper
  - Cashier
  - Collector

Taxes
- Federal Corporation
- State Corporation
- Income Tax
- Real Property
- Personal Property
- Licenses

Interest
- Interest on Investment
- Interest on Commercial Paper
- Interest on Loans

Losses and Depreciation
- Bad accounts
- Losses on contracts
- Depreciation on tools and stock supplies
- Losses by theft, fire and law suits
- Breakage
- Strikes and time lost
- Market fluctuations

Miscellaneous
- Charitable Donations
- Christmas Presents
- Cost of organization, charter, etc.
- Books and magazines

Societies and Conventions
- Association Dues
- Convention Expenses

Selling Overhead Expense

Salaries and Commissions
- Salesmen
- Solicitors
- Estimators
- Draughtsmen

Advertising
- Daily papers
- Programs
- Directories
- Signs
- Printing
- Photographs

Petty Expense
- Entertainment
- Stationery

Office Overhead Expense

Rent
- Office
- Janitor Service

Light, heat and water

Telephone
- Local Rental
- Long distance tolls
- Telegrams

Salaries
- Office manager
- Bookkeeper, stenographer
- Clerk and office boy
- Auditor

Maintenance and Repairs
- Furniture repairs
- Typewriter and adding machine repairs
- Cleaning rugs, papering, painting, etc.

Cost of Collections
- Salary of collector
- Legal expenses
- Mechanics' liens
- Postage, carfare, etc.

Sundry Expense
- Stationery, including ink, paper, time slips, books of record, supplies
- Expressage for office not chargeable to stock or work in progress

Incidentals
- Postage, towels, drinking water, etc.

Shop Expense

Shop Costs
- Superintendent's salary
- Employees,—non-productive wages
- Rent
- Heat, light, power

Stockroom
- Stock-keeper's salary
- Rent
- Light and heat
- Cleaning and petty repairs

Delivery Department
- Delivery boys
- Automobile or horse and wagon
  - Cost of upkeep
  - Depreciation
  - Taxes, repairs

Employees' salaries

Carfare

SUGGESTIONS FOR CONTRACTOR AND DEALER

DEPARTMENT CONDUCTED BY GEORGE A. SCHNEIDER

(In order to protect both men and motors without at the same time making it necessary to shut down the plant every time there is a short circuit, the type of controlling and protecting devices to use is a matter which must be carefully weighed. A review of Western methods and an original suggestion or two will prove helpful in considering this problem.—The Editor.)

NOTES ON UNDER-VOLTAGE RELEASE ATTACHMENT FOR CONTROLLING AND PROTECTIVE DEVICES

Since the publication of the National Electrical Safety Code by the United States Bureau of Standards there has been a steadily increasing demand for motor starting, controlling and protective devices, which are equipped with under-voltage release features. This demand results from two causes; first, because in several states this code has been adopted in part by the industrial accident commission and under certain conditions the use of devices so equipped is mandatory; second, because the value of these features as a "Safety First" measure is now more generally recognized and they are being more largely adopted in many installations even though their use is not required by any particular law.

In the National Safety Code, the rule indicating when devices equipped with under-voltage features must be provided will be found in paragraph (c) of section 340. The rule reads as follows:

"Manually controlled starters for motors shall be so designed and circuits so arranged that they return automatically to the 'off' or starting position upon failure of the energy supply, except where the motors and their starting devices are, during operation, under supervision of qualified persons and equivalent protection is otherwise provided."

In the California Electrical Utilization Safety Orders a similar requirement will be found in paragraph (d) of Order 747. The intent of this order is the same as the corresponding rule in the National Code although the wording is slightly different.

These particular rules will require very little change in the common types of direct current starters and regulators as it has been standard practice for a number of years to equip these devices with the under-voltage attachments. This statement may also be applied to starting compensators for alternating current motors since all of the later designs have similar attachments. However there are many of these devices, such as drum type starters or controllers and automatic starters for both direct and alternating current motors and many starting switches for alternating current motors of those sizes which do not require a starting compensator that do not give the protection required by these rules. On this account there are many re-designed or new lines of control devices being developed which not only comply with these particular rules but include many other safety features as recommended in the National Code.

As is to be expected a great many questions about these rules and the method of making installations to comply with them are brought up, especially in California where the safety orders have been effective since January first of this year. The various questions which have come to the writer's attention most often are outlined in the following paragraphs. They apply in particular to alternating current apparatus and for this reason our discussion of them will be mostly concerning alternating current motors, controlling devices and systems. From this our readers should be able to understand the requirements for equivalent direct-current installations.

(a) What is the difference between a no-voltage, a low-voltage and an under-voltage release? What is the difference between low-voltage release and low-voltage protection?

(b) What is the purpose of the low-voltage feature—to protect the operator or the motor, or both?

(c) How many low-voltage coils should be provided for polyphase apparatus—one only or one for each phase?

Let us now take up these questions in the order they are stated. The definitions of the terms low-voltage release and low-voltage protection as adopted by the Electric Power Club are:

"Low-voltage release. The effect of a device operative on the reduction or failure of voltage to cause the interruption of power to the main circuit but not preventing the re-establishment of the main circuit on return of voltage.

"Low-voltage protection. The effect of a device operative on the reduction or failure of voltage to cause and maintain the interruption of power to the main circuit."

From these definitions it should be clear that low-voltage release provides for the return of a device to the off position in case of reduction or failure of voltage but allows the device to again operate upon return of voltage. A good example is a contactor or self-starter controlled by a float switch. Such a device would automatically stop and start a motor as the voltage was removed from or returned to the line.

Conversely, low-voltage protection provides for the return of the device to the off position upon failure or reduction of voltage, but will prevent the device from automatically operating upon return of voltage. The ordinary starting compensator with low-voltage coil and spring return switch works in this way and is a good example of this action. Automatic starters can be arranged to give low-voltage protection by providing one or more push button stations, each having a starting and a stopping button so connected that the device will start only from the starting button.

The terms no-voltage, low-voltage and under-voltage are commonly used interchangeably and mean one and the same thing. Some prefer one term; some another. It is noticeable that one of the large electrical manufacturers recently adopted the term under-voltage in preference to the others. This is in contrast to over-voltage and corresponds to the terms under-load and overload. The term under-voltage is preferred by the writer as it seems to be more logical and descriptive and will be used in the remaining part of this article. It has not been used exclusively in the questions listed because the other terms seem to more clearly express the questions as commonly stated.

This statement applies so far to the discussion of the questions.

Considered from the standpoint of protection to the electrical equipment, the purpose of the under-voltage protective feature is not so much to protect the individual motor as it is to relieve the power system of having to pick up the entire starting load of a number of motors following some emergency condition which caused a failure of voltage on the system. If it is remembered that the momentary starting current of the average 60 cycle squirrel-cage polyphase motor started at full line voltage is about 7 times full load current it will be appreciated that a large number of induction motors not having starting compensators equipped to give under-voltage protection might under certain conditions cause serious delay in again restoring service after each shut down.

However, this statement should not be taken to mean that starting compensators with under-voltage features are always most desirable. There are certain conditions under which better service can be given with compensators or starting devices having proper overload protection only. Consider a large power system with a number of sub-stations and a number of feeders originating in each sub-station. A severe short circuit on one of the feeders may have practically the same effect as a complete interruption, allowing starters equipped with instantaneous under-voltage features to operate and thereby shut down the motors. With the feeder system properly sectionalized and equipped with the right kind of protective devices a short circuit would ordinarily be cleared within a few seconds, at least very often before an induction motor would drop its load due to the momentary reduction in voltage. Under such conditions it is better practice to have the under-voltage attachments equipped with a short time limit or eliminate them entirely and depend upon an overload device for the necessary protection.

This scheme of protecting alternating current motors is extensively used by one of the large power companies in the West. This company has several interconnected power houses and a large number of sub-stations. They furnish power for several thousand motor-driven irrigating plants, most of which operate without any attendant. It is obvious that it would not be desirable to have each one of these plants shut down every time there was a short-circuit or other disturbance which would cause a momentary drop in voltage. To guard against these shut downs this particular company requires that compensators except under certain conditions shall not have under-voltage attachments. Their rule covering this particular requirement reads about as follows:

"Three-phase motors of 7.5 h.p. and over shall be provided with oil circuit breakers having two adjustable inverse time-limit overload trip coils. These circuit breakers are to be connected with the starting compensator so they will not be cut into the motor circuit until the compensator handle is thrown into the running position. Fuses shall be used on the starting side up to 30 h.p. inclusive on 220 volts and to 50 h.p. on 440 volts. No under-voltage feature is to be installed on the starter or circuit breaker. The above type of circuit breaker, however, is not required on motor installations where the customer maintains constant operating attendance so that in case of emergency all switching and starting devices can be immediately attended to so as to prevent damage to apparatus."

At this point it is well to note carefully that the under-voltage attachments when used with three-phase (or two-phase) induction motors cannot be depended upon to operate except upon reduction or failure of voltage in all three phases of the circuit supplying the motor. They will not protect against reduction or failure in voltage in a single leg or phase of a three-phase circuit and will therefore not give protection against single-phase operation of the motor. A three-phase induction motor will run single-phase after having been brought up to speed and by reason of its transformer action will at the same time supply sufficient voltage through its windings to hold in the under-voltage attachment even though this might be connected to one side of the open-circuited phase and receive no voltage supply direct from the main circuit. This being the case, a single under-voltage attachment, that is, a single-coil device connected across one phase of the motor leads will provide all the protection, under these conditions, that the two- or three-coil devices will, as recommended by some manufacturers. Complete protection against overload and single-phase operation in polyphase motors must be secured by means of suitable overload features. The under-voltage features are operative only upon failure or reduction of voltage in all phases or after the overload device has performed its function. This brings out the necessity of carefully selecting overload devices. An under-voltage device is of little value unless proper overload devices are also provided. It is of course best to combine all of these features when possible in a common device.

In the April 1st issue of the Journal of Electricity in this department in the article on alternating current motor troubles it was pointed out that a three-phase motor operating single-phase will take at any load approximately 175 per cent of the corresponding three-phase current. Hence, any device which will limit the load to 25 per cent overload which is common practice will also prevent single-phase operation. This will in turn insure positive operation of the under-voltage attachment for as soon as one leg or phase of the circuit is opened, the overload device will operate and open the remaining phase, thus de-energizing the under-voltage coil and allowing the protective device to return to the off position. It is necessary, however, that the under-voltage coil be connected across the motor leads on the motor side of the protective apparatus. In protective devices for single-phase motors the under-voltage feature will, of course, operate independent of the overload device if the voltage is sufficiently low. This would be the case also with direct current devices equipped with under-voltage features.

From the safety standpoint the function of the under-voltage attachment is to protect the operator on motor-driven machines or tools by opening the motor starting or controlling device automatically in case of interruption to the supply circuit. This will prevent any possibility of accident to the operator who may be working on the machines while they are shut down due to the unexpected starting of the motor when power is again restored to the circuit.

It should be noted carefully that these rules demand devices equipped to give under-voltage protection, that is, the device must return to the off position upon reduction or failure of voltage and remain in that position.

ELECTRICITY AT THE UTAH STATE FAIR

BY C. W. KENDALL

(Dealers in electrical goods must not neglect state fairs and conventions as an effective medium of advertising. More electrical cooking equipment for commercial purposes is used in Salt Lake City than almost anywhere else in the United States—and undoubtedly this is due in large part to such effective exhibits as that of the Utah Power and Light Company at the recent Utah State Fair.—The Editor.)

Indoor View of the Exhibit of the Utah Power and Light Company

"DO It Electrically" was the lesson emphasized by the Utah Power & Light Company during their exhibition and demonstrations of electrical apparatus and appliances at the Utah State Fair held at Salt Lake City September 29th to October 6th inclusive. All of the leading manufacturers' goods were represented in the practical demonstrations of the workings of electricity in the home, shop, commercial, industrial and farm uses, in an endeavor to educate the public to the numerous advantages to be gained by its use.

The entire display was conducted on the Company's permanent location at the Fair Grounds, occupying approximately 10,000 square feet of space. A large building occupies the center of this space, in which were demonstrated the various commercial and domestic labor saving appliances, visualizing to the thousands of visitors the many practical uses of electricity.

The approaches to the building were made very attractive by landscape work including flower beds, green parking and a "Fountain of Light" occupying the center space in front of the building. The grounds and exterior of the building were well lighted by the use of flood lights and also by a number of smaller incandescent lamps mounted on lamp posts. A large American flag on top of the building was effectively lighted by the use of flood light projectors.

The interior of the building was divided into several booths. The decorations consisted of autumn leaves and floral designs, together with a number of flags, etc. Type C-2 "Daylight" Mazda lamps were used entirely for interior lighting and created much favorable comment. Vocal and instrumental music was furnished every day under the direction of the Salt Lake Song Shop; an interesting feature of which was the fact that all instruments used were electrically operated.

The electric range demonstration in the model electric kitchen attracted more than passing interest. The perfect heat control, cleanliness, ease of operation, food saving and other features of electric cooking were forcibly brought out. Much benefit in popularizing the "electric cooking idea" undoubtedly resulted from these demonstrations.

The exhibition of Modern Electric Baking attracted universal attention. A large Hughes Electric Bake Oven was installed and operated to its capacity during the entire week. Thousands of pieces of pastry, cake, bread, cookies, etc. were prepared and baked in full view of the visitors. In order to conserve the product, it was placed on sale by the baker at a nominal price and proved so delicious that the supply could not keep up with the demand. Salt Lake City is one of the foremost users of electric cooking equipment for commercial purposes.

The Electrical Exhibit at Night

To the north of the main building was erected a large tent in which were shown the various applications of electric power for irrigation pumping, house water pumping, feed grinding and other farm uses, also commercial and industrial applications. The large number of farmers who visited this exhibit and witnessed the operation of the various machines under actual conditions were convinced of the desirability of using electricity on the farm.

Throughout all departments particular emphasis was laid on the part electricity plays in aiding in the conservation of materials and labor, which are so necessary at the present time.

Weather conditions during the week were ideal and approximately 150,000 visitors were in attendance at the Fair, a large majority of whom visited the electrical display.

Much credit for the success of this exhibit is due to the hearty co-operation of the electrical dealers and manufacturers of Utah, among whom are: General Electric Company; Western Electric Company; Fairbanks-Morse Company; Intermountain Electric Company; Westinghouse Electric & Manufacturing Company; Eardley Brothers Company; Utah Corrugated Metal & Flume Company; Salt Lake Hardware Company; State Milling Company; Borden Milk Company; Bonnie-Goddard Company; Eureka Vacuum Cleaner Company.

FARMER RESPONDING TO ADVERTISING

An instance of the intensive application of electric power in irrigation is that of the Perris and San Jacinto valleys, California, comprising an area of approximately 70,000 acres, which are fast coming to the fore as one of the most intensively cultivated alfalfa districts of the State.

The principal factors contributing to the success of the district are the open seasons, fertile soil and a plentiful supply of subterranean water.

The methods of lifting the water to the surface, and distributing it over the lands as needed, have undergone great improvement during the last two or three years, which has not only reduced the cost of pumping, but secured a more equable and efficient application of the water. The power for pumping was originally furnished by gas engines, but due to increasing cost of fuel oil, electricity is fast displacing the gas engines. Marked economies have been secured in cost of electric power by the construction of small, inexpensive reservoirs. Instead of pumping water direct to the lands by large pumping units, at irregular intervals, and consequent heavy cost for power, the reservoirs permit the utilization of smaller pumps and motors running continuously, which effects large savings in power cost.

Constitution of Utah Society of Electrical Contractors and Dealers

(For the upbuilding of conditions in the industry, contractors everywhere are learning to unite and pull together. As this is the latest organization of its type to be formed, its constitution will be of interest to contractors and dealers throughout the West.—The Editor.)

ARTICLE I
Name

The name of this organization shall be Utah Society of Electrical Contractors and Dealers.

ARTICLE II
Objects

The objects of this society are:

A. The development of the electrical business in the territory covered by the Society.

B. The establishment of a friendly relation between its members and between the various branches of the electrical industry in its territory.

C. The establishment of the electric contracting and merchandising business in its territory on a successful commercial basis.

D. The discussion of subjects of interest and value to the industry.

E. The dissemination among its members of accurate and reliable information pertaining to the industry.

ARTICLE III
Membership

Membership in this society shall be divided into two classes, Active and Associate.

Active members shall be electrical contractors. This term includes all persons, firms or corporations employing electric wiremen and carrying on the business of installing electrical apparatus for lighting, power, heating or other service as their main business.

Associate members shall be divided into three classes, A, B, and C.

Class A membership comprises all central stations, municipal electric light and power plants, telephone companies and electrical railroad companies and companies of like character.

Class B membership shall comprise any individual, firm or corporation, except those qualified as regular or Class "A" Associate members engaged in any branch of the electrical business, but who does not do installation work, and also any retailer handling electrical material but not engaged exclusively in the handling of the same, and also any electrical dealer or contractor coming within the division of a regular member, but operating in a territory outside of the territory covered by this association.

Class C membership shall include individuals, employes or officers of Active members and of Class A and B Associate members other than the authorized representatives of such members.

ARTICLE IV
Territory

The territory covered by this Society shall include the State of Utah and those portions of Idaho, Nevada, Wyoming and Montana regularly covered by salesmen representing Salt Lake jobbing houses.

ARTICLE V

The membership shall stand in the name of an individual representing the person, firm or corporation and the Secretary-Treasurer shall recognize such persons as authorized to represent as a member such person, firm or corporation with power to vote at meetings. Each individual, firm or corporation shall be entitled to name, in addition to the representative in whose name its membership shall stand, an alternate.

ARTICLE VI
Dues

The initiation fee of Active members and Class A and B Associate members shall be $10.00 and the annual dues shall be $36.00. The dues shall be paid quarterly, in advance, on the first day of January, April, July and October.

There shall be no initiation fee for Class C members; the annual dues shall be $2.50, payable annually in advance.

If, however, any member remits for his dues within thirty days after due date for the fiscal year, he shall be entitled to a discount of 20 per cent.

ARTICLE VII
Fiscal Year

The fiscal year shall begin the first day of January each year and shall end on the following 31st day of December.

ARTICLE VIII
Suspension for Non-Payment of Dues

Any member may be expelled from the Society for non-payment of dues, after a period of ninety (90) days from the date when the said dues become due and payable.

The membership of any member suspended as aforesaid who fails to pay such dues within ninety (90) days after suspension shall as a result of such failure and without further action in the premises terminate unless said period of ninety (90) days be extended by the Executive Committee, in which case his membership shall without further motion terminate at the end of the extended period.

ARTICLE IX
Officers

The officers of the Society shall be a President, Vice-President, Secretary-Treasurer and Executive Committee. The President, Vice-President and members of the Executive Committee, except the Secretary-Treasurer, shall be elected by ballot at the annual meeting. The Secretary-Treasurr shall be selected by the Executive Committee. The Executive Committee shall consist of the President and Vice-President ex officio, and five (5) additional members.

Only representatives of Active members shall hold office, except in the case of the Secretary-Treasurer.

ARTICLE X
Sub-Committees

The Executive Committee shall have the power to appoint such sub-committees as it may from time to time deem necessary.

ARTICLE XI
Duties of Secretary-Treasurer

The compensation of the Secretary-Treasurer shall be fixed by the Executive Committee. He shall keep the books of the Society and perform such duties as may be delegated to him by the Executive Committee.

The Secretary-Treasurer of the Society shall be custodian of the Society funds. He shall deposit such funds with banks or trust companies approved by the Executive Committee and shall file with each of such banks and trust companies a copy certified by the President of Article XI of this constitution.

He shall furnish a bond in an amount to be determined by the Executive Committee and the expense of such bond shall be borne by the Society.

The Executive Committee shall employ a certified public accountant who shall annually audit the account of the Secretary-Treasurer. Such public accountant shall file a written report of his investigation with the President and such reports shall be read at the next regular meeting.

The Executive Committee shall have control of and direct the disposition of the funds of the Society. No limitation shall be placed upon said committee's power to draw on and distribute the funds. The action of this committee must have the consent and approval of a majority of its members.

ARTICLE XII
Meetings

The annual meeting of this Society shall be held in the Fall of each year at a time and place to be designated by the Executive Committee. A regular meeting to be called a "Spring Meeting" shall be held each Spring at a time and place to be designated by the Executive Committee.

Special meetings may be called from time to time by a majority vote of the Executive Committee.

ARTICLE XIII

By a two-thirds vote of the entire Executive Committee, any member may be expelled for cause, provided, however, that such member is given an opportunity to be heard before the said committee. On the questions of such expulsions neither the accusing nor the accused member shall be entitled to vote.

ARTICLE XIV

This constitution may be revised and amended at any general meeting provided that such revisions or amendments are submitted in writing to the Secretary-Treasurer at least thirty days in advance of any regular meeting. It shall be the duty of the Secretary-Treasurer to forward to each member at least ten days in advance of any regular meeting copy of such proposed revision or amendment.

ARTICLE XV

Except where otherwise provided Robert's Rules of Order shall govern the parliamentary procedure of this Society.

THE MANUFACTURE OF CARBIDE FROM LAMP BLACK

(A recent question from one of our readers on this subject has led to investigation on our part—and the accompanying statement by E. C. Jones, of the Pacific Gas & Electric Company. A certain amount of carbon from Oakland, Cal., has been successfully used in manufacturing electric light carbons, but Mr. Jones believes that the small manufacturer can not hope to compete with the big companies of Niagara Falls.—The Editor.)

The cost of manufacturing calcium carbide is practically divided into three parts: power, one-third; material, one-third; labor and over-head, one-third.

The mixture used under the above heading of material is two-thirds lime and one-third carbon. The form of carbon used at Niagara Falls is broken hard coal, which costs $1.40 a long ton delivered at the works. Before the war this same material cost 80c a ton. The lime at Niagara is burned in their own kilns at a cost of $3.30 per ton delivered at the furnace. It costs 34c a ton to quarry the lime stone and it requires three tons of lime stone to make two tons of lime. One and one-half tons of the above mixture produces one ton of calcium carbide, so that there is one-third of a ton of carbon in each ton of carbide, and at the price of hard coal at Niagara there is .46⅔c worth of carbon in each ton of carbide, and roughly the cost of the carbon in calcium carbide is 1/60th of the total cost of the carbide.

Aside from the use of carbon in making calcium carbide, it is necessary to use lime free from magnesia, as lime containing in excess of 2% of magnesia acts as a flux and destroys the carbide. In order to use the lampblack it would be necessary to purchase this lime and make sure that it was of the right quality. This would mean constant laboratory tests or the purchase of a lime-stone quarry of suitable rock and the construction of kilns for burning lime.

The next important item is electric power, and it was discovered early in the art that the only way to get high efficiency and cheap carbide was to install very large units, and the smallest electric furnace in use at Niagara today, which gives efficiency sufficient to successfully meet competition, is 15,000 horsepower.

A plant of this description recently completed and including two electric furnaces (one only of which is used at a time), lime kilns, crushers, grinders, etc., costs $1,500,000, and in this plant on account of the low voltage and high amperage there is $100,000 worth of copper.

The smallest electric furnace for making carbide is 100 horsepower and it produces 4 lbs. of calcium carbide to a horsepower day, or 400 lbs. carbide total per day, and based on eastern prices the cost of operating this furnace is $100.00 per day, or a cost of 25c per lb. for calcium carbide.

While there has been an advance in the price of carbide, the present price in San Francisco is $90.00 per ton or 4½c a lb.

The calcium carbide manufacturers make money by the use of tremendously large electrical units with increasing efficiency from 15,000 horsepower up, but it is futile for a small manufacturer to think of going into the carbide business.

LETTER TO THE EDITOR ON ACCIDENT PREVENTION

Journal of Electricity,
618 Mission St., San Francisco.

Sir:

I have read with much interest the editorial in the October 1st issue of the Journal of Electricity, under the heading "Overdoing Accident Prevention."

We read in this editorial "that in some instances the well desired ideal of 'safety first' is being perverted into the slogan of 'safety mad,'" together with the expressed hope that the undercurrent of protest now inwardly felt among men of industrial and engineering endeavor may be at an early date lessened by somewhat more reasonable and sane demands from accident commissions and other bodies of a similar nature.

In the first instance, it is clear to us how certain individuals may become over enthusiastic and attempt to initiate requirements which are unjustifiable and beyond reason. On the other hand, despite the undercurrent of protest, a certain amount of which must always be looked for, the majority of wide awake enterprising concerns engaged in manufacturing and public service have cast aside prejudice and are receiving the full measure of benefit through an earnest campaign for accident prevention.

During a recent visit to the southern part of the State, I was very cordially received in the office of the Vice-President and General Manager of one of the public service corporations, who remarked in the course of our conversation that his company had learned to "bank on the Industrial Accident Commission." The Southern Pacific Railroad Company, in its energetic campaign for safety first is carrying out the true spirit of co-operation by encouraging its employees to make suggestions which may result in better and safer working conditions for themselves. From their reports we learn that from 1913 to 1916 inclusive 15,559 safety suggestions were received in the interest of employees, 75 per cent of which were found practical and carried out at an approximate investment of three quarters of a million dollars. This was all done voluntarily and is by no means considered a burden to this industry.

The management of one of our large cement plants writes us that the result of their safety first activity shows a monetary saving of $50.00 a day.

It would appear to the hard headed business man that this is worth looking into.

We read according to the report of M. Andre Tardieu, the French High Commissioner to the United States, that during the last six months of 1916 the casualties in the French Army numbered only a little more than 1% of those under arms. This included the Somme Offensive and the Fall Drive against Verdun. It is also noted that the percentage of casualties in this war is less than in the last year of our Civil War. It would be difficult indeed to find a true American who would lift his voice against building up the "Red Cross" fund to alleviate the suffering of our defenders at the front who fall in the battle for world freedom. Who, then, can consistently protest against the activity of commissions or individuals which has the effect of lessening the suffering and decreasing the fatalities to our industrial soldiers who are falling at their posts while playing their part in the struggle for world freedom?

The United States Government has seen the advisability of taking very definite steps for the protection of those who are now employed in government shops such as at Navy Yards, Arsenals, etc., through the United States Employees Compensation Commission.

After due thought we must come to the conclusion that it is just as essential to provide means for protection of those in industry as those on our battle front.

Very truly yours,
ROBT. L. ELTRINGHAM, Electrical Engineer.

WHAT WESTERN INVENTORS ARE DOING

BY WM. K. WHITE AND H. G. PROST

(The contractor, the central station man, the engineer, the man in every branch of electrical industry has his own ideas how to improve the apparatus which passes through his hands. For the man who may some day become an inventor and for the man who must deal with him, this department is to be conducted. The present article covers the general foundations of patent law and points out some of the recent electrical inventions which have come from the west. The authors are members of the firm of White and Prost, prominent patent attorneys of San Francisco.—The Editor.)

NOTES ON THE LAW OF PATENTS

The present is an era of invention by the trained engineer and chemist and of great business enterprises founded on patent protection. In representing his client's interests the engineer is frequently confronted with patent problems. Whatever may be his personal views in respect to patents and inventions, he must appreciate the possibility and danger of his client becoming involved in infringement or other patent controversies. In order to perform his full duty to his client and safeguard his client's interests, the engineer must have a fairly good knowledge of patents and must know the elementary principles of patent law. Much patent litigation may be avoided if the engineer in charge of a concern's new development work has knowledge of the law of patents sufficient to enable him to realize a patent problem exists and to intelligently attempt to solve the same without involving his client in unnecessary litigation. Furthermore, many valuable patent rights are lost through ignorance of the patent law.

Abraham Lincoln once said that the American patent system is intended to "add the fuel of self-interest to the fire of genius."

The power of the United States to grant to inventors certain exclusive privileges is derived from the following clause in the eighth section of the first article of the Constitution:

"The Congress shall have power * * * to promote the progress of Science and Useful Arts, by securing for limited Times, to Authors and Inventors the exclusive Right to their respective Writings and Discoveries."

Acting under such authority, Congress has passed four Acts, which have in turn been the basis of our entire patent system: the Acts of 1790, 1793, 1836 and 1870. The Act of 1870 became the basis of the present provisions of the Revised Statutes controlling patents.

Under the English kings, various monopolies were granted to individuals by public letters addressed to the general public. From the Latin name of these letters, "literae patentes" is derived "letters patent," meaning open letters or letters addressed to the public. It is by such "letters patent" that the United States grants certain exclusive privileges to inventors.

What Inventions Are Patentable

Section 4886 of the Revised Statutes of the United States provides that:

"Any person who has invented or discovered any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvements thereof, not known or used by others in this country, before his invention or discovery thereof, and not patented or described in any printed publication in this or any foreign country, before his invention or discovery thereof; or more than two years prior to his application, and not in public use or on sale in this country for more than two years prior to his application, unless the same is proved to have been abandoned, may, upon payment of the fees required by law, and other due proceeding had, obtain a patent therefor."

Patent Defined

A patent for an invention is a contract between the party claiming to be the inventor thereof and the Government. In consideration of the inventor disclosing his invention to the public, the Government grants him, for the period of seventeen years, the right of preventing all others from making or using or selling his invention. At the end of such seventeen year monopoly, the public is free to make, use or sell the invention. It is to be noted that an United States patent grants no right to make, use or sell anything; it grants only the right of preventing all others in the United States from making, using or selling the invention covered thereby.

The law does not require the owner of a patent to make any use of the invention covered thereby. If the patent power so desires, he may refrain from making, selling or using any device embodying the patented invention and, at the same time, prevent all others from making, selling or using such devices.

Inventors

"The right of property which an inventor has in his invention, is excelled, in point of dignity, by no other property right whatever. It is equaled, in point of dignity, only by the rights which authors have in their copyrighted books. The inventor is not the pampered favorite or beneficiary of the government, or of the nation. The benefits which he confers are greater than those which he receives. He does not cringe at the feet of power, nor secure from authority an unbought privilege. He walks everywhere erect, and scatters abroad the knowledge which he created. He confers upon mankind a new means of lessening toil, or of increasing comfort; and what he gives cannot be destroyed by use, nor lost by misfortune. It is henceforth an indestructible heritage of posterity. On the other hand, he receives from the government, nothing which cost the government or the people a dollar or a sacrifice. He receives nothing but a contract, which provides that for a limited time he may exclusively enjoy his own. Compared with those who acquire property by devise or inheritance; compared with those who acquire by gift or marriage; compared with those who acquire property by profits or sales, or by interest on money, the man who acquires property in inventions, by creating things unknown before, occupies a position of superior dignity. Even the man who creates value by manual labor, though he rise in dignity above the heir, the donee, the merchant, and the money-lender, falls in dignity below the author and the inventor. The inventor of the reaper is entitled to greater honor than his father who used the grain cradle, and the inventor

of the grain cradle is entitled to greater honor than his ancestor, who, for a hundred generations, had used the sickle. Side by side stand the inventor and the author. Their labor is the most dignified and the most honorable of all labor; and the resulting property is most perfectly theirs." (Walker on Patents.)

As said by Francis Bacon:

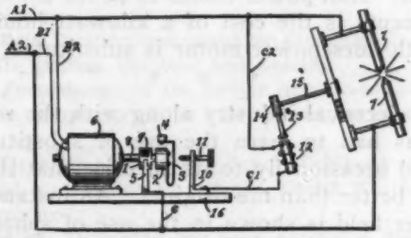
"Now among all the benefits that could be conferred upon mankind, I discovered none so great as the discovery of new arts for the bettering of human life. For I saw that among the rude people of early times, inventors and discoverers were reckoned as gods. It was seen that the works of founders of States, law-givers, tyrant-destroyers, and heroes cover but narrow spaces, and endure but for a short time; while the work of the inventor, though of less pomp, is felt everywhere, and lasts forever."

To the same effect are the following remarks of Judge Grosscup:

"Inventive genius has given to mankind most of its present material civilization. The magnificent flower of civilization, everywhere surrounding us, has opened from germs that were fructified from the brains of inventors."

1,239,720. **Carbon Feeding Mechanism.** Walter G. Preddey, San Francisco, Cal.

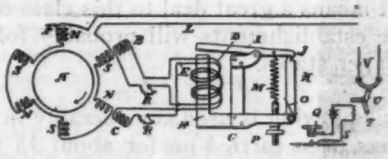
This invention relates to electric arcs and particularly to means for varying the distance between the carbons in accordance with variations in voltage in the arc circuit.



Shunted across the circuit is a small motor, the speed of which varies with the voltage. A centrifugal switch rotatable with the motor armature operates at high speeds of revolution to close a circuit containing the carbon feeding electromagnet.

1,239,795. **Protective Device.** Ernest O. E. Klipphahn, Dobbins, California.

This invention relates to a protective device for electric motors and operates to display a signal when an unsymmetrical condition obtains in the field windings. A differential electro-responsive device is provided with coils associated



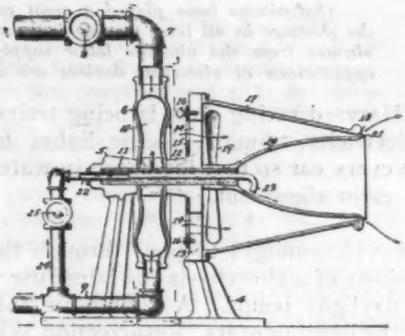
each with different field coils and an unbalanced condition in the field coils causes the differential responsive device to operate and display a signal.

1,239,465. **Solder.** William A. Day, Bellingham, Washington.

This patent discloses a material for soldering cast iron, mild steel, aluminum and other metals and is composed of an alloy of five parts lead, five parts tin and one part zinc.

1,240,683. **Oil Burner.** Theron C. Curtiss, San Francisco, California.

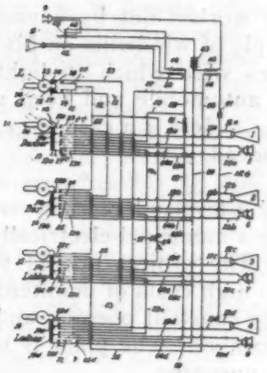
This patent discloses an oil burner comprising a shell within which is arranged a bell having a fan attached thereto which blows air through the shell when the bell is rotated.



Secured to the bell shaft is a rotor which is driven by the flowing oil under pressure. The oil which is burned is taken from the fuel circulating pipe and conveyed into the bell through a tube.

1,239,607. **Telephone Paging System.** Nathan A. Kurman, Oakland, California.

This invention relates to telephone systems employing loud speaking receivers located throughout an establishment



so that announcements may be made or persons called in a loud voice. The system is designed so that the announcement may be made at all stations or at one selected station.

1,239,731. **Separable Plug.** Milton H. Shoenberg, San Francisco, California.

The invention relates to separable electric plugs composed of base and cap members and the invention consists in securing a rigid element to one member which engages the

other member, so that the members may be separated only a limited distance. This distance of separation is sufficient to separate the contacts, but when so separated, the two parts of the plug are still held together.

SPARKS—Current Facts, Figures and Fancy

(Substitutes have played a great part in this war—and it is not the least interesting development of the shortage in all lines to note in how many cases electricity is proving the substitute. Gasoline, coal, nitrates from the air—the labor supply—in each case electricity has come to the rescue. Ingenious new applications of electrical devices are always diverting.—The Editor,)

The Harvard racing crew is being trained by the aid of electricity. Small electric lights have been placed on every oar so that the coach in watching may catch errors in alignment.

* * *

To provide sunlight to pour through the stained glass windows of a church—is the latest use found for the new daylight lamps. A church in San Jose is featuring the lighting of its "Resurrection Window" in local notices of its evening services.

* * *

It is reported that in the field of the exploitation of nitrates directly from air a new process has been discovered in Germany which works with quadruple air velocity through the reaction space and produces a result about 80 per cent higher than could be obtained before.

* * *

A scheme to make even a cold wind warm his home has been worked out by a man in Wisconsin who uses a couple of windwills on his farm to charge storage batteries with which to light and heat the house, run his automobile and keep no end of farm machinery going. Here is a case of getting electricity from the air, indeed.

* * *

The city of Cleveland recently tried the experiment of running a municipal electrically operated cold storage plant. The project proved to be a failure, however, due to high costs of maintenance and to the difficulties of the constant opening and closing of the refrigerating chamber. The plant is now being used for commercial purposes.

* * *

Coal gas is proposed as a substitute for gasoline in England. The Bureau of Mines in this country is working toward the use of an economical type of engine in our four million automobiles. By this means they hope to reduce the consumption of gasoline from twenty to ten billion gallons a year. Why not save some of it by using electricity?

* * *

The Food Conservation campaign in a way is an electrical issue. The great amount of outdoor advertising is largely by electric signs, films run by electricity are being shown in moving picture houses, electricity is being advocated as a coal saver, electric refrigerating plants are being erected to meet the demands, electric fans advertised for the drying of food.

* * *

Udovletvoritelni means "satisfactory" in Russian and when you remember that the H sounds like N, the P like R, the N like I, the X like H, the C like S and the Y like U, it is very simple. It is a word which we hope to hear often when our electrical industry begins to take advantage of new opportunities in Russia.

* * *

The first American-built long distance telephone line in France has been completed by the army signal corps of engineers. Except the poles, which were made from French trees, everything for the line was brought from America. It is said to be a great treat for the officers to be able to take the receiver off the hook and talk through an American instrument instead of the dubious types used on the continent.

* * *

The horse has been reduced to horsepower by C. O. Crane of the Idaho Power Company. In advocating the use of electricity on the farm, he points out that a horse worked in the average routine of a farm day can furnish energy at about 15½ cents per kilowatt hour. Man power comes to $2 for the same unit. Twelve cents is the cost of a kilowatt hour when a one-eighth horsepower motor is substituted.

* * *

The electrical industry along with the rest of the world has had to learn the use of substitutes—and has found occasionally to its surprise that the substitute was better than the original. An instance of this in another field is shown in the use of sphagnum, or peat moss, as a surgical dressing. Although it was a forced substitution, it has been found a great improvement over cotton, the fibres not adhering to the wound but allowing easy removal. The plant grows abundantly in damp places in Western Washington.

* * *

The High Cost of Labor has struck Japan. The Far East Commercial Supplement states that the Railway Board has decided to raise the wage standard. Officials receiving less than 40 yen ($19.94) per month are to have a 2-yen ($1) increase, and those who are paid per diem are to get 6 sen (3 cents) more each working day. "Two yen a month seems to be a small sum, but it means a great deal to this class of workers. All private establishments will probably follow suit," the newspaper states.

* * *

Electric plowing is used considerably in Germany, where it has been carried on for about 15 years, and to a lesser extent in Italy and other European countries. One system in use has mounted on the plow a 100-horsepower motor-operated drum around which a cable makes a few turns and then attaches to anchor wagons at each end of the field, these wagons being automatically moved the required distance at each reversal in the process of plowing. The energy is derived from a 2-wire trolley supported by the wagons. The machine plows in both directions by a reversal of the shears.

PERSONALS

Frank Fagan, western manager of the Edison Lamp Works with headquarters in San Francisco, recently delivered an excellent lecture before the Northwest Electric Light and Power Association at Spokane, Wash., along lines that will be of great assistance to central stations in selling the electrical idea for better lighting in the homes of consumers. Interesting portions of this lecture, together with illustrations appear elsewhere in this issue. Such work as this has a high educative value for widely disseminating the strong features of recent advances in lighting methods and should receive the encouragement and moral support of all. Incidentally Mr. Fagan is receiving congratulations on all sides due to the fact that a bouncing baby girl arrived in his household on the evening of October 21st, Edison Day, of which he was the originator. This day commemorates the birth of the first incandescent lamp invented by Edison Oct. 21, 1879.

Lee R. Cooke has been appointed city engineer of Nampa, Idaho.

J. P. Bell, Pacific Coast manager Standard Underground Cable Co., is visiting Portland and Seattle.

S. B. Fortenbaugh of the foreign department of the General Electric Company and his wife are visitors on the Pacific Coast.

C. R. Dederick of the Fobes Supply Company at Portland has resigned his position to join the Keeler White Company at San Francisco.

Robert W. Thompson has been appointed district engineer for the Government of British Columbia, with headquarters at Kamloops, B. C.

J. T. Stewart, formerly with the Electric Railway and Manufacturing Supply Company, is now with the Standard Electric Construction Co. of San Francisco.

E. O. Shreve, assistant manager of the San Francisco office of the General Electric Company, is in the East and will not return until about the middle of November.

John A. Britton, vice-president and general manager of the Pacific Gas & Electric Company, has been elected chairman of the San Francisco Chapter of the National Red Cross.

Charles N. Black, of the firm of Ford, Bacon & Davis of New York City, formerly vice-president and general manager of the United Railways of San Francisco, is a recent San Francisco visitor.

D'Arcy Ryan was the originator of the lighting effects used to such good purpose in the Noah's Ark Pageant given recently at Sutro Baths, San Francisco for the benefit of the Allied War Relief and Tobacco Funds.

Milton Henoch of the Supply Department of the Westinghouse Electric Company has been on the coast for the last month. He is now in Los Angeles and plans to stop off at Salt Lake City and Denver on his way east.

R. C. Coffy, vice-president of the Puget Sound Gas Company, has been appointed a member of the committee of five to draft constitution and by-laws for a new civic booster club for Everett (Wash.) merging the city's present commercial clubs.

A. Brewster Hall, district sales manager of Pass-Seymour Company of Syracuse, New York, attended the quarterly meeting of the California Association of Contractors and Dealers at Fresno and has since been spending a few days in San Francisco.

A. S. Halls was elected president of the Oregon Association of Electrical Contractors and Dealers and the association members consider the organization fortunate in securing such an able electrical engineer and contractor as its executive head for the coming year.

A. S. Kalenborn is now electrical engineer and superintendent of power for the Cerro de Pasco Mining Company, Cerro de Pasco, Lima, Peru. He formerly was electrical engineer for the San Joaquin Light & Power Corporation, California.

Charles W. Reid, vice-president of the Rathbone, Sard & Company of Chicago, manufacturers of electric ranges, is an interested Pacific Coast visitor and has recently added enthusiasm to the electrical industry in the West by talking at the San Francisco Electrical Development and Jovian League.

W. E. Jones, western manager of the Economy Fuse Company with headquarters at Seattle, and **J. C. Manchester,** the new San Francisco representative of this company, were interested attendants at the recent quarterly meeting of the Pacific Coast Electric Supply Jobbers at Beverly Hills near Los Angeles.

Thomas Roberts has been named the third member of of the arbitration board to settle the wage dispute between the Portland Railway, Light & Power Company and the street car operators. **Otto R. Hartwig** of the State Federation of Labor represents the carmen's side of it and **John P. Newell,** consulting engineer, the company.

Tracy Bibbins and **Harry Noack** of the Pacific States Electric Company; **Garnett Young** of the Telephone Electric Equipment Company; **W. M. Deming,** business manager, and **Robert Sibley,** editor of the Journal of Electricity are among those who journeyed southward to attend the recent quarterly sessions of the Pacific Coast Electrical Supply Jobbers at Beverly Hills near Los Angeles.

F. E. Kearney, R. M. Alvord, C. S. Hull and **F. D. Fagan** were among the heads of departments who attended the pleasant reception given recently by **Miss H. R. McDonald,** head of the welfare work of the General Electric Company at San Francisco to the women employees of that company. **F. F. Barbour** and **F. M. Ray** as former heads of departments were also included among the guests.

S. C. Jaggar, owner and manager of the Morrison Electric Company of Portland, Oregon, attended the recent National Electrical Contractors' Association convention held in New Orleans as Oregon's delegate. Mr. Jaggar who is a very progressive electrical dealer also went on to New York to attend the Jovian convention in that city and to find anything n w there might be in the electrical line, and will return about the first of November.

A group of bold fishermen: O. B. Stubbs, S. W. Peterson, C. M. Wills, F. N. Averill, H. B. Squires, H. E. Anderson. Can you place any of them in the picture?

Here are two mighty hunters, known to men of the electrical industry as "Sandy" and "Stubs." The wire shown to the left is to provide telephone communication to report to a waiting world their deeds of valor.

Wm. S. Cone has resigned as manager of the U. S. Reclamation Service's Salt River project at Phoenix, Arizona, to form an engineering partnership with **Irving C. Harris** of Los Angeles, and has opened consulting offices in the Hollingsworth Building, Los Angeles. Mr. Cone was closely identified with the design and construction of several of the early hydroelectric installations of the West, including those of the Southern California Edison Company. Later he was associated with the late H. H. Sinclair in the Great Western Power Company's developments and subsequently was manager of the Sacramento district. Then he joined the Reclamation Service and now is again in private practice, to which he brings a broad experience and wide acquaintance. Mr. Harris, likewise, is thoroughly equipped from a technical standpoint for consulting electrical work.

J. C. Martin, chief engineer of the Pacific Power and Light Company, has resigned his position to accept service with the Lehigh Securities Corporation with headquarters at Allentown, Pa. Mr. Martin came with the Pacific Power and Light Company in its early days of organization and not only has he contributed noteworthy effort in his company's engineering organization but he has performed lasting work on many committees of the Northwest Electric Light and Power Association, especially along the lines of drawing up proper rules for overhead line construction and telephone inductive interference. As chairman of the Technical and Hydro-Electrical Committee for two years he has come in close touch with engineers the country over, but especially throughout the Northwest. The engineering fraternity of the West bemoan his retiring from endeavor in this section of the country, but the best of good wishes go with him in his new field of work.

Ira Nelson Hollis, president of the Worcester Polytechnic Institute and president of the American Society of Mechanical Engineers, arrived on the Pacific Coast during the current week. Mr. Hollis is making a tour of the country in the interests of the United States Government. He is recruiting high-class engineers to work on the big war problems facing the Government. At both Los Angeles and San Francisco, engineers of the coast made elaborate plans for his entertainment. He was shown about the cities, introduced to the men of his profession and to the big engineering projects now under way. A banquet was given in his honor at the Palace Hotel. Prominent engineers from all the bay counties attended this banquet and the four engineering societies of San Francisco participated in the program. These included the local sections of the American Institute of Electrical Engineers, the American Society of Mechanical Engineers, the American Society of Chemical Engineers and the American Institute of Mining Engineers. Each had a representative speaker. The speakers were Professor Harris J. Ryan, professor of electrical engineering, Stanford University; C. D. Marx, professor of civil engineering, Stanford University; T. A. Rickard, editor of the Mining and Scientific Press; L. H. Duschak of the United States Bureau of Mines and B. F. Raber, assistant professor of mechanical engineering, University of California.

OBITUARY

John M. Winslow, sixty-one years of age, one of the pioneer telephone builders of the state of Washington, recently died at his country home near Silver Lake, Snohomish county. Mr. Winslow was born in Philadelphia. As a civil engineer he was engaged for a number of years in Mexico. Going to the Pacific Northwest he settled in Tacoma, and fifteen years ago he went to Seattle to reside. He held the position of secretary-treasurer of the Puget Sound Telephone Company and was active in the company's affairs up to the day of his death.

AN AMERICAN ACADEMY OF ENGINEERS

A bill recently before the Senate recommended the incorporation of an American Academy of Engineers. Gen. Geo. W. Goethals, Dr. S. W. Stratton, Director of the Bureau of Standards, and many other expert engineers and scientists strongly support the measure.

The objects of the proposed organization are first to render loyal and effective service to the government of the United States as far as lies in its power, and second to advance in every legitimate manner the interests and welfare of the engineering profession in all its numerous branches. The establishment of such an academy has been under consideration for eight years.

PROVIDING COAL FOR PUBLIC UTILITIES

It will be the duty of local committees on Fuel Administration to enforce regulations of the Fuel Administration in their districts, to report general conditions to the State committees, to arrange for supplies in case of shortage, and to hold local hearings on infractions of rules.

Twenty per cent of the industrial concerns asking for coal do not need it, according to L. A. Snead, of the Fuel Administration. He told of one factory that was discovered to have a reserve of 204,000 tons of coal, a year's supply, photographs of which are in possession of the Fuel Administration. Mr. Snead did not, however, belittle the claim of the manufacturer who really needs coal. He told in detail of supplying emergency needs for industrial and public utility companies. In the past two weeks the Fuel Administration has distributed approximately 3,000,000 tons for Government requirements to some 2000 locations.

TACOMA RAILWAY & POWER COMPANY'S REPORT

The annual report of the Tacoma Railway & Power Company has been filed with the public service commission, covering the financial operations of the company for the calendar year 1916.

During the year 23,615,660 passengers were carried of which 5,753,037 were free transfer passengers. In addition 802,405 employes and other persons were carried free, a total of 24,418,065.

The total operating expenses were $689,103.40 for the year. This amount included $436,207.77 wages and salaries paid during the year. The average fare collected was 3.69 cents per passenger. But two fatal accidents occurred during the year.

The company had 99 passenger cars and 65 freight cars in operation and the total track mileage, 106.2 is the largest of any city in the United States in proportion to population. The company paid $8,646.79 taxes for the year covered by the report.

MEETING NOTICES FOR ELECTRICAL MEN

(The Quarterly Meeting of the California Association of Electrical Contractors and Dealers held at Fresno has constituted the most important meeting of men of the industry during this semi-monthly period. The Pacific Coast Electrical Supply Jobbers' Association, another most important gathering, is now at session at Beverly Hills as these forms go to press. Other meetings of electrical interest are noted below.—The Editor.)

Fresno Meeting of California Association of Electrical Contractors and Dealers

The regular quarterly meeting of the California Association of Electrical Contractors and Dealers was held at Fresno, California, Oct. 12-13. The outstanding features of the meeting were the preliminary report of the legislative committee on the state ordinance for licensing contractors and the report of the retail committee on the proposed co-operative selling campaign.

The license measure proposes that a state examining board of three or five members be appointed to pass upon the qualifications of all contractors entering the electrical business. The expenses of the board would probably be met by a system of fees required from all working contractors. These proposals will be shaped into a bill to be presented at the next meeting of the legislature.

The retail committee's report gave the outline of the proposed selling campaign to be conducted jointly under the auspices of the light and power companies, contractor-dealers, and jobbers. The contractor-dealers and jobbers have pledged $7000 toward the estimated cost of $14,000 for the first year's campaign and are now awaiting the action of the central stations in raising the balance.

H. W. Kimball presented a constructive report as delegate to the contractors' conventions at Vancouver, Spokane and Eugene during September. The British Columbia association has 98 per cent of the contractor-dealers in the territory as members. The organization is in a strong position and working very closely with the other electrical interests. An extended review was given of F. B. Milligan's discussion on the credit relations between the contractor-dealer, the jobber and the public wherein he recommended an improved form of contract, prescribing time and percentages of payment for work done. He also reported the proceedings of the Washington and Oregon associations, details of which have already been published in these columns.

W. D. Kohlwey, the delegate to the national convention at New Orleans, telegraphed a brief report of progress there, including the appointment of H. C. Reid as chairman of the Pacific Coast Section and of P. S. Butte, E. E. Brown and H. C. Reid as the San Francisco committeemen, H. W. Kimball and C. W. Kenney as the Oakland representatives, and J. F. Rendler and G. E. Arbogast at Los Angeles, together with the secretaries of the state and several local associations as well as members of the national association in other towns.

The association subscribed $500 toward the purchase of Liberty Bonds and selected Santa Barbara as the meeting place for the annual convention in June, 1918.

At the banquet on Saturday night the principal speakers were W. M. Deming of the Journal of Electricity, D. E. Harris of the Pacific States Electric Company, E. B. Walthal of the San Joaquin Light & Power Corporation, and Albert H. Elliot, secretary of the jobbers' association. Mr. Deming emphasized the need for co-ordination of effort and outlined what the contractor-dealers should do to merit the central stations' turning over to them the merchandising of appliances. Mr. Harris spoke of the awakening of the electrical industry. Mr. Walthal told how the dealers could work more closely with the central stations. The session was closed with a characteristically fine address by Mr. Elliot on the relations between the contractor-dealers, jobbers and power companies.

Special mention should be made of the excellent arrangements, beautiful decorations and fine entertainment provided by the Fresno reception committee. Each delegate was presented with a basket of grapes and every attention paid to his personal comfort.

San Francisco Electric Development and Jovian League

The Smoker set for Thursday evening, Nov. 1st under the able leadership of R. F. Behan of the Westinghouse Electric & Manufacturing Company with the skit entitled "An Inductive Interference Morning" has evidently a scream in it from start to finish. From the advanced sale of tickets it appears that the meeting will be widely attended.

The meeting of the League for Wednesday, October 17 was ably conducted by Harry Bostwick of the Pacific Gas & Electric Company who introduced Senator Cutten, the well-known attorney of his company, as speaker of the day. Mr. Cutten read a paper on the new income tax which is so timely in its helpfulness that it is printed in full elsewhere in this issue.

The meeting of the League for Wednesday, October 24 was a memorable one.

The new executive committee has evidently some real activities ahead, well worthy the serious attention of men of the industry.

An outline of the program for meetings in the near future was given by Robert Sibley, President of the League. These include an Electrical Industry and Electrical Contractors and Dealers Day, with Arthur Kempston of the Depart-

BUILDERS OF THE WEST—XVI.

JOSEPH N. LE CONTE

"Little Joe" is a term of endearment known to that large group of engineers who have had the privilege at one time or another of registering in courses of engineering mechanics and hydraulics at the University of California. Here is an instance of how a quiet, unassuming personality manifests itself in the lives of men and has added its quota as a Builder of the West. To Joseph N. Le Conte, professor of engineering mechanics at the University of California, an engineer of marked research attainment and unusual ability as a teacher of severe analytical and mathematical subjects, this issue of the Journal is affectionately dedicated.

ment of Electricity, San Francisco, and Robert Eltringham of the California Industrial Accident Commission as speakers, a proposed invitation to the California Railroad Commission to attend the League in a body as guests of honor for the day, a University Day, State Engineers' Day, and Old Timers' Day are also to be added, to aid the co-operative spirit so manifest at the meetings.

A glowing compliment was paid to electrical engineers by Capt. Boyden when he stated that big men in that branch were offering their services in a way that no other branch was doing.

Pacific Coast Gas Association

The following members of the Pacific Coast Gas Association were elected to serve as officers and directors for the coming year:

John D. Kuster, president, Pacific Gas & Electric Company, San Jose; A. B. Day, vice-president, Los Angeles Gas & Electric Corp., Los Angeles; Henry Bostwick, secretary-treasurer, Pacific Gas & Electric Company, San Francisco. Directors: John A. Britton, Pacific Gas & Electric Company, San Francisco, Cal.; Geo. P. Egleston, Coast Counties Gas & Electric Company, San Francisco, Cal.; B. S. Pedersen, George M. Clark & Co. Div., San Francisco, Cal.; D. J. Young, San Diego Cons. Gas & Electric Company, San Diego, Cal.; Samuel C. Bratton, Portland Gas & Coke Company, Portland, Ore.; F. S. Wade, Southern Counties Gas Company, Los Angeles, Cal.; Leon B. Jones, Pacific Gas & Electric Company, San Francisco, Cal.

The Twenty-Sixth Annual Convention of the Pacific Coast Gas Association will meet at Los Angeles, California, in September, 1918.

San Francisco Engineers' Club

The San Francisco Engineers' Club held a rousing house warming on the evening of Friday, October 26, 1917. The annual election of officers took place with the following results: President, B. P. Legaré; vice-president, W. H. Shockley; secretary, A. E. Chandler; treasurer, J. T. Whittlesey. Directors: C. W. Merrill, E. O. Shreve, H. W. Crozier, W. W. Briggs, E. B. Bumsted, C. H. Snyder, C. C. Broadwater and Ely Hutchinson. The principal feature of the evening was a rousing address by Dr. Ira Hollis.

Oakland Jovians Meet

"What the Electrical Industry Can Do Toward Helping the Government in the Present Crisis" was the topic of an address by Ezra Decoto at the fall luncheon of the Jovian Order in the Hotel Oakland Oct. 25, 1917. Henry Spott Mellman presided. Other speakers were Frank A. Leach, Jr., Norman Ellis, Hugh Kimball, Rodney Kenyon and Ross Gilson.

The Los Angeles Jovian Electric League

The Los Angeles Jovian Electric League has entered upon a new era of usefulness with the election of H. N. Sessions, commercial engineer of the Southern California Edison Company as its president.

Other officers elected are as follows: K. E. Van Kuran, first vice-president; G. E. Arbogast, second vice-president; W. C. McWhinney, secretary and treasurer, and the following directors: R. H. Ballard, J. O. Case, R. Walfsburg, A. B. Day, E. P. Morphy and F. J. Airey.

The meeting for October 17, 1917 had as its invited guests Wm. G. McAdoo, Secretary of the Treasury; Laird J. Stabler, professor of chemistry University of Southern California; Hughie Mack, Anthony Carlson, and Arthur M. Fournier, all men who can add zest to any gathering.

Jovians from all sections of the country will receive a hearty welcome at these Los Angeles gatherings.

Oregon Society of Engineers

The first lecture of the Oregon Agricultural extension courses given under the auspices of the Oregon Society of Engineers, was delivered on Saturday evening, Oct. 6th by Professor Otto B. Goldman, at the lecture room of the East Side Branch Library, this being the initial lecture of the Thermics Course. The attendance and interest shown indicated that this course will prove to be of great benefit to the members.

The next lecture was that by Professor C. B. McCullough, being Lecture No. 1 of the course in Structural Engineering, on Saturday evening, Oct. 13th, at the same place.

These series of lectures are to continue on Friday and Saturday evenings with intermission for the holidays up to the close of the University term in June of 1918.

BEVERLY HILLS HOTEL

Here may be seen the beautiful and fascinating headquarters of the Pacific Coast Electrical Supply Jobbers' Association which is holding an interesting session at Beverly Hills as these forms go to press. As we scan this picture the scenic charm overcomes us — but also — where are the happy care-free jobbers? Look in the windows and observe them in thoughtful session, or search out the golf course—ah, there they are! The next issue of the Journal of Electricity will inform its readers of some of these thoughtful sessions and introduce them to the champions of the golf course that will have been brought into the limelight by that time.

HAPPENINGS IN THE INDUSTRY

New Power Loads

Electrical equipment has been installed at Higgins-Bielenberg and the Lake Shore properties at Twin Bridges. Mines will work to their maximum. The companies figure the line will pay for itself in a year's time in the fuel saved.

The Soldiers' Home at Columbia Falls, Montana, has installed an electric 80-loaf bake oven which is being served by the Northern Idaho & Montana Power Company. All baking and roasting of meats for the home is now being done electrically.

The Albany, Oregon, division of the Oregon Power Company has placed 47 electric ranges during a four months' campaign, and has prospects for a considerable number of additional sales. Contract has been secured with a saw mill adjacent to the company's 11,000-volt line between Corvallis and Philomath, covering its electrical energy requirements amounting to 45 horsepower in motors.

The Holt Manufacturing Company of Stockton, Cal., which is being served electrically by the Western States Gas & Electric Company, has increased its requirements by 150 horsepower in motors. The company is also supplying an additional 75 horsepower for the Stockton Fire & Enamel Brick Company, the total electric load of this plant now amounting to 255 horsepower in motors.

New business secured by the Stockton division of the Western States Gas & Electric Company includes approximately 60 horsepower in motors for the Sperry Flour Company. It is anticipated that this load will be increased until the entire requirements of the Sperry Company—amounting to between 700 and 800 horsepower—is being served by the Western States Company.

The Arkansas Valley Railway, Light and Power Company will furnish electric energy amounting to from 300 to 400 horsepower in motors for the operation of the Holly Sugar Company's plant at Swink, Colorado. The new zinc mill to be constructed at Canon City will also be served by the Arkansas Valley Company. Its original requirements will amount to 100 horsepower in motors, to which it is expected that 100 horsepower units will be added from time to time.

Washington Water Power Company, Spokane, is disposing of more than 40,000 h.p. of electricity monthly at the present time as compared with about 33,300 a year ago or an increase of 20 per cent, according to C. S. McCalla, vice-president and general manager. This includes the additional power being used in the Coeur d'Alene and other mines as well as that used by business houses, private consumers and by the Bunker Hill and Sullivan Mining and Smelting Company in its new smelter at Kellogg.

New Buildings and Companies

North Star Power Company has bought the electric lighting business of R. H. Clow.

Calistoga Electric Company has removed its headquarters from Oakland to San Francisco.

J. A. Hunt of Pleasanton will open an electric store in Antioch, Cal., in the near future in a salesroom occupied by the Delta Electric Company.

The Rainier Heat & Power Company, Oriental building, Seattle, Wash., has a permit to make repairs at 504-16 Fifth Avenue South at a cost of $2000.

A building permit has been granted the General Electric Company for repairs to the amount of $5000 to be made on their property at 16th and Campell streets.

The Toyo Electrical Industry Company has been formed by J. Odaka and associates, to manufacture electrical supplies and apparatus at Nagoya, Japan, with a branch at Tokyo.

Kilbourne & Clark Manufacturing Company of Seattle, Wash., maker of wireless apparatus, is now moving its plant from the Poulson building to its new location on the East Waterway.

The Oakland Mazda lamp factory has taken out a building permit for an addition to its plant. The cost of the expansion will total close to $100,000, $85,000 going for the building and the balance for equipment.

The transformer building at Camp Lewis is 27 by 27 feet and 31 feet high. It is built of paving brick. Inside is a balcony 12 by 15 feet above a concrete base on which the transformer will be placed. Three 55,000-volt wires lead to the building.

The Oregon Power Company at Dallas, Ore., is putting in some important improvements in its power house in Dallas. The old 150 horsepower engine is being taken out and is to be replaced by one of 750 horsepower, which is in fact capable of generating 1000 horsepower of "juice." A 450 kilowatt generator is being installed.

A deal has been consummated by which A. Welch has acquired the water and electric holdings of The Washington-Idaho Water, Light & Power Company. The new company will be known by the same name, but the offices have been moved from the old location in the Adams block to the corner of Main and Third streets, at Clarkston, Wash.

Kilbourne & Clark Manufacturing Company, manufacturers of wireless apparatus, has moved from the Polson building, Seattle, to a concrete building recently purchased on the East Waterway. The force is to be increased to 350 or 400 men. The present force consists of 125 men. The company is busily engaged in getting out important government work, contracts for which were secured some time ago.

Changes in Rates and Wages

The application of the Tualatin Valley Electric Company to increase its rates for service in the towns of Tualatin, Sherwood and Tigard and surrounding rural communities has been allowed by the Oregon Public Service Commission.

The Tillamook County Mutual Telephone Company of Oregon has petitioned the public service commission for permission to increase its residence telephone rates from $1 to $1.25 a month and its business telephone rates from $1.50 a month to $1.75.

Finding that the earnings of the Cheney Light & Power Company of as high as 35 per cent a year are excessive, the public service commission, upon the complaint of the residents of Cheney, has directed a reduction in rates that will cut the profits to about 8½ per cent.

Assistant Corporation Counsel Walter F. Meier of Seattle was in Olympia recently appearing for the city in a writ of review granted by the Thurston county superior court on an order of the State Public Service Commission, eliminating four cent car tickets so far as the Puget Sound Traction Light & Power Company is concerned.

By a two-to-one vote, the Public Service Commission denied the application of the Portland Railway, Light & power Company for a 6-cent street car fare. The commission points out that it is not clothed with authority to fix schedules of wages, but reports the result of its investigation and says: "Viewing this question from the standpoint of all parties concerned, we believe that the granting of a shorter basic day and a reasonable increase in wages is justified."

The second raise to be granted in one month has been allowed by the Washington Water Power Company, Spokane, Wash., to trainmen in its employ for three years or more. The new wages are retroactive to Sept. 14. The increase is

1 cent an hour for men who have been with the company three years and 2 cents for those who have completed fifteen years of service. The extra men are raised $5 a month and the minimum salary guarantee for them has been made $65. The revised schedule allows two-man car employees of three to fifteen years' service 35 cents an hour and the one-man workers 39 cents. Those of fifteen years or more are allowed 37 and 41 cents for two-man and one-man service, respectively.

The 30-40-45 cent wage scale and the eight hour day asked by the platform men of the Portland Railway, Light & Power Company have been granted by the board of arbitration. The new wage scale became effective at once and the eight-hour day is to be put into effect as soon as it can be arranged. The findings of the board will be in effect up to January 1st next and it is hoped by that time means will be found by which the revenues of the company may be increased to keep it in force thereafter. The state public service commission recently refused the request of the company to charge a six cent fare in order to meet these conditions.

Personal Changes

G. B. King has been appointed electrician and telegraph inspector, Pacific System, headquarters San Francisco, Cal.

E. H. Martin is to superintend the construction of the new plant of the Pacific Gas & Electric Company at Fresno, California.

O. M. Hartshorn, formerly secretary at Pueblo, has been transferred to be secretary at the City Light & Water Company, Amarillo, Texas.

E. R. Waite, who was in the general bookkeeping department of the Denver Gas & Electric Light Company, is to be secretary of the Pueblo (Col.) Gas & Fuel Company.

Mr. R. G. Berle of the Los Angeles District Office of the Westinghouse Electric & Manufacturing Company, has recently been transferred to their Chicago District Office.

Mr. Tiltz of the Ilg Electric Ventilating Company is now permanently located as Pacific Coast agent for the above concern and he anticipates carrying a complete stock of fans, blowers, etc. on this coast.

George G. Bowen, assistant sales manager of the Northwestern Electric Company, reports the completion of the new business office of his company, located at the corner of Tenth and Washington streets in the Pittock Block.

The Ward Leonard Electric Company, of Mount Vernon, N. Y., manufacturer of electric controlling devices and vitreous enamel insulation resistance units, announces that it is now represented in Cleveland, O., by Walter P. Ambos Co., The Arcade.

E. H. Sennott, assistant treasurer of the Metropolitan Building Company, Seattle, Wash., for the last eight years, has resigned to re-enter the employ of the Stone & Webster Engineering Corporation, for which firm he will go to France as a financial director.

Mr. Fries, formerly of the Levy Electric Company and later of the Gas & Appliance Company, has become associated with The Electric Shop of M. C. Baker & Son, San Francisco, and has taken over full charge of all the electric contracting and wiring department.

Charles H. Button of Lebanon, Oregon, has purchased the controlling interest in the Lindsay Telephone Exchange, at Fresno, from A. M. Robertson. Mr. Robertson, who is also secretary of the Lindsay Chamber of Commerce, will move to San Francisco, where he will engage in business.

E. W. Lindquist has been appointed Pacific Coast manager for the Allis-Chalmers Manufacturing Company of Milwaukee, Wis., succeeding Fred L. Webster, who recently became manager of Chicago territory. Mr. Lindquist formerly was sales engineer with the mining machinery department of the company at Chicago.

J. M. Reid, formerly with the O. L. & I. Railroad Company, which operates a 125-mile electric line between Ogden, Utah and Idaho points, has been made superintendent of the Mount Hood Railroad, with a 22-mile line penetrating the Hood River valley in Oregon from Portland to Parkdale. Mr. Reid succeeds Ashley Wilson.

The notation on the Pacific Coast Agency of the Stanley and Patterson Company made in the Journal of Electricity on October 15, 1917, should read: The Pacific Coast Agency of this company has been placed in the hands of H. B. Squires Company—except Southern California and Oregon which are still covered by R. B. Clapp.

To Increase Output of Coal in Utah

That freight rates on Utah coal to California points are unjust and unreasonable and much higher than the rates on Wyoming coal to Portland, Ore., and that for distance operating expenses and volume of business handled the rates are considerably in excess of those prevailing in other parts of the United States, was the evidence given by F. A. Sweet, president of the Standard Coal Company, before the Interstate Commerce Commission. With his evidence the battle opened of the coal companies against the Denver & Rio Grande and other railroads.

Mr. Sweet testified that the output of Utah mines last year was 3,600,000 tons. He thought the output could be increased to 6,000,000 or 6,500,000 tons if proper facilities were at hand. If the mines were worked to full capacity, he said that about 2,500,000 tons of coal could be shipped out of the state every year.

Great Western Supplies Service for Football Practice

The Saint Mary's football squad is being well worked out by coaches Wilson and Smith for the big game with the Marines at Ewing Field, San Francisco. The coaches have found out that the short time after school is not sufficient to get the boys in tip-top shape for the game, so they have hit upon a novel scheme. In the courtyard of the College lights and reflectors have been installed that give a radiance that is nearly like day. Then in order that the ball may be easily seen during this night practice, it is whitened and so everything is in fine shape.

Western States Gas & Electric Company

Report of gross and net earnings for the Western States Gas & Electric Company for the month of August, shows marked advance over earnings for the corresponding month of 1916. The figures in detail follow together with report of earnings for the year ended August 31, 1917 and 1916:

	1917.	1916
Month of August—		
Gross earnings	$ 116,649	$ 97,515
Net earnings	55,428	47,084
Year ended August 31—		
Gross earnings	1,340,331	1,218,887
Net earnings	630,712	581,353

Pacific Gas & Electric Co.

	1917.	1916.
August gross	*$1,662,202	$1,494,401
Net after taxes	562,033	560,924
Surplus after charges	205,265	222,724
12 months' gross	*19,922,094	19,080,989
Net after taxes	8,081,459	8,325,184
Surplus after charges	3,922,505	4,256,166
Balance after pfd. div.	2,477,181	3,065,825

*Includes sums involved in rate litigation: 1917, $24,494; August, 1916, $24,532; twelve months, 1917, $335,826; twelve months, 1916, $368,112.

United Railways, San Francisco

United Railroads of San Francisco, a subsidiary of the California Railway & Power Company, reports as follows for the fiscal year ended June 30, 1917:

	1917.	1916.
Gross earnings	$7,458,142	$7,751,743
Net earnings	2,205,940	2,337,709
Other income	163,121	178,525
Total income	2,369,061	2,576,234
Interest, etc.	2,105,582	2,047,738
Net income	263,479	468,496

An appraisal of the value of the United Railroads' physical properties which has been undertaken by the California Railroad Commission is expected to facilitate the work of representatives of the city and the company who are meeting for a similar purpose.

GOOD BOOKS AND BULLETINS FOR ELECTRICAL MEN

Electrical Appliances and Apparatus

Automatic Electric Faucet Company, San Francisco, Cal., has issued a bulletin in which its circulating water heater is illustrated by drawings and half-tone cuts. In this type of electric water heater there are no coils, and it is of high thermal efficiency, operating on either the 220 or 110-volt alternating current, at capacities of one to 8 kilowatts, according to sizes of electrodes used. In these "Hotwat" appliances the water is heated by electrodes before it passes into the hot-water tank.

A new booklet, No. 370, is now being gotten out by the Esterline Company describing the uses and application of their graphic instruments.

A booklet containing a reprint of H. P. Reed's recent address before the Elevator Manufacturers' Association of the United States on "Unique Features of Electric Elevator Control" and a collection of useful tables on motor equipment has been issued by the Cutler Hammer Manufacturing Company of Milwaukee, Wisconsin.

The American Heater Company under the title of Bulletin No. 40 has issued a 32-page description of their electric heating devices and appliances with a revised price list.

A new folding booklet gotten out by the Hotpoint Electric Heating Company advertises a variety of its wares—and repeats the offer of the Hotpoint Mission Art Supply to dealers.

Miscellaneous

The Mining Division of the Safety Department of the Industrial Accident Commission of California in Bulletin No. 8 lists the accidents among mining men in the state. Of the 30 fatal accidents, 2 were electrocutions.

"The Colorado River in its Relation to the Imperial Valley, California" is the title of a report by C. E. Grunsky which has recently been published as Senate Document No. 103. This is the first publication of a report made by Mr. Grunsky several years ago as consulting engineer of the U. S. Geologic Survey.

A series of publications by the Bureau of Mines is now covering various aspects of the coal situation—the prevention of accidents, absorption of gases by coal, etc.

The annual report of the Rockefeller Foundation covers the work of the International Health Board, the China Medical Board and the War Relief Commission. The Foundation has recently established a school of Public Health in cooperation with John Hopkins University especially designed for chemists, engineers, etc.

To bring about immediate action by American business on the resolution passed at the recent war convention at Atlantic City recommending that each industry form a committee to represent that industry and to serve as a connecting link between it and the government, suggestions are given in a war bulletin issued by the committee of the Chamber of Commerce of the United States co-operating with the Council of National Defense.

The ease with which records may be found and assembled or grouped for comparison marks the grade of efficiency in any filing system. The recent literature issued by the 'Findex' Company offers interesting reading to anyone looking toward the improvement of office methods.

In the conduct of war today engineers play a far greater part than ever before. A census of Mining Engineers, Metallurgists and Chemists has recently been made by the Bureau of Mines and a report of its findings is now ready. (Technical Paper 179, Bureau of Mines.)

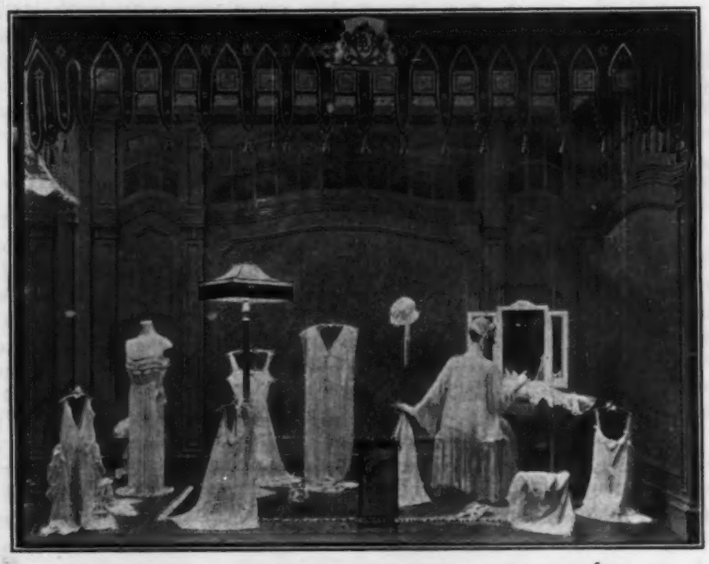
"Mesopotamia—the Key to the Future" is the title of a booklet by Canon Parfit which points out the possibilities of this neglected country which with its rich oil fields and improved transportation offers promising opportunities for the future.

BOOK REVIEWS

Theory and Calculations of Electrical Apparatus

By Charles Proteus Steinmetz, A. M., Ph. D.; size 6x9 in.; 480 pp.; published by McGraw Hill Book Co., New York City and for sale by the Technical Book Shop, San Francisco. Price $4.00.

The text is designed for the use of the electrical engineer and contains a comprehensive treatment of the numerous apparatus which have found their place in the theory of electrical engineering. The author has covered the important types in common use and also has included many which have not as yet reached any industrial importance but which, with the changes in industrial conditions, may in the future find extensive practical use. In some respects this work may be considered as a continuation of the author's earlier work on "Theory and Calculation of Alternating Current Phenomena," which with its 5th edition has been subdivided into three volumes, of which this forms one. As with the author's former work this book will be found a standard reference in its line.



SUCCESSFUL USE OF THE DAYLIGHT LAMPS

The very latest in window lighting is illustrated here — a bright window with no glare, one that will attract the customer, a clear illumination of all the goods on display in their true colors — this is a window which draws the window shopper from blocks around. The display was a feature of the recent opening of the enlarged Livingston Bros. clothing store in San Francisco.

NEW ELECTRICAL DEVELOPMENTS

(A large pulp mill to be erected in Washington, installations incidental to the electrification of a railroad, new electrical requirements by the growing ship building industry—these are signs of the times. For the greater convenience of our readers the news notes will hereafter be run with reference to the great natural subdivisions of the West.—The Editor.)

THE PACIFIC NORTHWEST

KASLO, B. C., CANADA.—The city electric system will be improved at a cost of $2000.

SEATTLE, WASH.—Board of Public Works is advertising for a considerable number of miscellaneous supplies for the Lake Union steam power plant.

TACOMA, WASH.—Chicago, Milwaukee & Puget Sound Ry. Co. proposes to construct a $150,000 power sub-station for its electric line between Tacoma and Othello.

BREMERTON, WASH.—At an election held recently the proposal to purchase the local electric light plant, to be owned and operated by the municipality, was defeated.

EVERETT, WASH.—It is probable that an election will be called this winter to vote on the question as to whether or not the city shall engage in the production and sale of electric power.

OROVILLE, WASH.—Okanogan Valley Power Company has petitioned the council for a franchise to erect and maintain power and light transmission lines over certain alleys and public places.

BAKER CITY, ORE.—D. C. Eccles and associates are preparing to erect an electric transmission line from the terminus of the Eastern Oregon Light & Power Company's line to the Bi-Metallic mine near here.

THE DALLES, ORE.—Plans have been prepared by Malcolm Moody of The Dalles for the construction of a large hydroelectric power project, including dam and power house, on the Deschutes river near here.

TACOMA, WASH.—The City Council of Tacoma has refused the offer of the Tacoma Railway & Power Company to operate the line to the tideflats at cost for two years. The line will be operated by the city of Tacoma.

SEATTLE, WASH.—Puget Sound Traction Light & Power Company has taken out a permit in connection with construction work on its plant on Western avenue due to changing from oil to coal burning equipment.

BURNS, ORE.—E. T. Brusselle has applied to the City Council for a franchise to install and operate an electric-light and power system in Burns. Arrangements, it is understood, are under way for construction of the proposed plant.

PORTLAND, ORE.—Several bonding companies have offered to take up the proposed $90,000 bond issue which the mayor and the council propose to issue for the construction of a municipal power and water system. The election is expected to be called for Nov. 15th.

INDEX, WASH.—The town council recently awarded the contract for furnishing a generator for the new light plant under construction to the Westinghouse Electric Co. Their bids were: 100 kva. alternator, $1,067; 3 kw. exciter, $160; switchboard, $399; automatic voltage regulator, $356.

EDMONDS, WASH.—The Washington Coast Utilities Company of Arlington, recently granted a franchise in Edmonds, will begin at once the installation of the local system. The distribution system now in use will practically be rebuilt and arrangements will be made to provide for considerable new business, which will include several small industrial plants.

EVERETT, WASH.—One of the largest pulp mill projects on the Pacific Coast is under consideration for Everett. It is proposed to put in a mill with a daily capacity of 400 tons. The plant will cost $15,000 a ton, or $6,000,000. Furthermore, the company proposes to spend about $3,000,000 on a hydroelectric plant in the Sultan basin, if the plant is located at Everett.

SEATTLE, WASH.—The Cooley Manufacturing Company has been incorporated and will build a factory here for the manufacture of complete marine electric lighting equipment and will supply all Pacific Coast shipbuilders. The plant will cost $20,000 and will be constructed at 1772 Second Avenue South. George R. Cooley, prominent electrical engineer and contractor, heads the concern.

SEATTLE, WASH.—Mayor H. C. Gill some time ago filed on a hydroelectric power project on the upper Skagit river in behalf of the city. This is to serve as a basis from which private contractors may bid. No bids were received for the proposed $3,000,000 hydroelectric plant for the city. This is presumed to have been due to the fact that every known power site in the section was controlled or held by private interests.

CORNUCOPIA, ORE.—A 66,000-volt line is to be built from Robinette to Halfway, a distance of 12 miles, for the purpose of delivering a minimum of 200 horsepower electrical energy to the Cornucopia Mines Company here. A sub-station will also be erected in Halfway and a distribution system is to be constructed so that this community may have service for lighting, power and general domestic purposes. The estimated cost of constructing lines and sub-station is $30,000.

KLAMATH FALLS, ORE.—Two new pumping projects will be started in Klamath county immediately. One is in the Bonanza district where about 17 adjacent ranches will be irrigated. There will be two lifts, one of 30 and one of 50 feet. Water will be taken from Lost river about half a mile from Bonanza. The cost will be about $11 an acre. C. T. Darley of the reclamation service will have charge. The other will be known as the White Lake project, near Merrill.

KLAMATH FALLS, ORE.—The farmers of upper Klamath County Valley, in eastern Klamath county have determined not to let another season go by without having water on their lands. A total of 1720 acres is embodied in the Willow Creek project, under which ten farmers of that section propose to get water at a low figure. Work is now well along on the dam. The County Court has set December 1st as the date for the hearing of a petition for the creation of an irrigation district in that neighborhood.

KIRKLAND, WASH.—Two power installations have just been completed in the Kirkland district. Three 25 kw. 13,000-volt transformers are being installed at Juanita to serve a 75 h.p. pump motor which is to be used for sluicing between Juanita and Kirkland for a new county road; and two 100 kw., 13,000-volt transformers at the Anderson Shipbuilding yard at Houghton, which has a connected load of 220 h.p. This is the first ship yard on Lake Washington to build ocean-going boats. They already have two ways constructed and expect to have a third completed by January.

THE PACIFIC CENTRAL DISTRICT

SEBASTOPOL, CAL.—The Board of Trustees has accepted the new street lighting plan proposed by the Pacific Gas & Electric Company.

EUREKA, CAL.—Laying of cable for transmission of power and light to Rolph Shipyards and later to the Fay plant has been ordered by officials of Western Gas & Electric Company.

MANTECA, CAL.—The Sierra and San Francisco Power Company is having the small power plant erected for the Manteca refinery of the Spreckels Sugar Company and the foundation has already been laid.

OROVILLE, CAL.—Richard M. Dale of San Francisco has applied for permit to use 750 cubic feet per second of Middle Fork of Feather river for hydroelectric power to be used for manufacturing purposes.

ST. HELENA, CAL.—Sealed bids will be received by the board of trustees up to Nov. 13th, for street lighting of said town for a period of one year from date. All bids are to be made on a flat monthly rate.

OROVILLE, CAL.—J. Sank, of Oroville has applied for permit to use 28 cubic feet per second from French Creek for hydroelectric generating power for mining and manufacture. His plans are to construct a timber crib dam.

RICHMOND, CAL.—The Western States Gas & Electric Company has received an application from the newly incorporated city of El Cerrito for electric service for street lighting purposes and an investigation is now under way.

SAN FRANCISCO, CAL.—The Great Western Power Company of San Francisco is contemplating the erection of an electric-transmission line from Vermont station, near Taylorsville, to the Walker mine, via Genesee mine in Genesee Valley, a distance of 16 miles.

AUBURN, CAL.—It is stated that the Pacific Gas & Electric Company will about the first of the year discontinue the use of the old Newcastle electric power plant. Transformers are to be installed at the Wise power plant in Auburn ravine below this city to take on the Auburn-Newcastle load. The work has been commenced.

STOCKTON, CAL.—The Pacific Telephone and Telegraph Company has appropriated $59,920 for additional lines and equipment in Stockton and in the Stockton territory, which includes all of San Joaquin county and portions of Calaveras, Stanislaus and Tuolumne counties. New long distance circuits are to be run between Stockton and Sacramento, and b 'ween Stockton and Lathrop.

FRESNO, CAL.—As a part of the construction work of the new gas plant for the Pacific Gas and Electric Company a $34,980 contract with Duncanson-Harrelson Company has been filed in the county recorder's office. The agreement calls for the dismantling of the gas container now at Martin Station, San Mateo county and its erection in the local plant in the Walsh subdivision. The construction is to be completed in five months from date of commencement.

OAKDALE, CAL.—Property of irrigation districts can not be taxed, according to a decision handed down by Judge W. H. Langdon in the suit brought by the South San Joaquin irrigation district to restrain the collection of taxes on its property, known as the Woodward reservoir in Stanislaus county. The ruling is important also for the Oakdale and South San Joaquin irrigation district, which now has pending a dispute with Tuolumne county, which is seeking to collect taxes on the bog Goodwin dam located in that county.

THE PACIFIC SOUTHWEST

SANTA ANA, CAL.—Tustin has voted to form a lighting district as also did Garden Grove.

NOGALES, ARIZ.—The Mountain States Telephone Co. is erecting a telephone exchange building here.

LOS ANGELES, CAL.—The Southern California Edison Company will spend $2,000,000 in the erection of a 12,500 horsepower plant at Big Creek.

OATMAN, ARIZ.—The Gold Ore mine at Gold Road is being equipped with electrically operated machinery, including a new hoist, a compressor, etc.

BAKERSFIELD, CAL.—The town of Mojave voted 52 to 0 in favor of forming a lighting district. Bids for the lighting system will be opened by the board of supervisors November 5th.

PLACENTIA, CAL.—An election will be held on October 22nd to vote upon the question of establishment of a highway lighting district known as Placentia Lighting District of Orange county.

SAN DIEGO, CAL.—The Board of Supervisors have awarded to San Diego Consolidated Gas & Electric Co. the contracts for the Imperial Beach, Normal Heights and Falbrook lighting districts.

MONTABELLO, CAL.—The board of city trustees has sold a 30-year franchise for oil pipe-line and telephone line across the city, along Cedar and other streets to the Union Oil Company, whose bid was $150.

SAN DIEGO, CAL.—The San Diego Consolidated Gas & Electric Company has practically completed the electric lighting system for Camp Kearney, which is one of the Government cantonments for the new national army.

LOS ANGELES, CAL.—The Los Angeles Railway Company has been ordered by the Public Utilities Commission to extend its South Park Avenue line from South Park and Slauson Avenue to 61st street and Moneta Avenue.

LOS ANGELES, CAL.—C. F. Mason, commercial superintendent for Southern California Telephone Company has announced that the company will spend $200,000 to facilitate the consolidation of the Home and Sunset telephone systems in Los Angeles.

EL SEGUNDO, CAL.—At a meeting of the board of trustees G. E. Ward, vice-president of the Southern California Edison Company, made a request that the board advertise and sell a lighting franchise for the city. The matter was turned over to the city attorney for the preparation of the necessary proceedings.

LOS ANGELES, CAL.—F. C. Riley and G. W. Gilbreth of Los Angeles have asked permit to use 20 second feet of San Gabriel river, 15 second feet of Iron Fork and 15 second feet of Fish Creek for hydroelectric power purposes. Plans provide for a tunnel and a six-mile pipe line and equipment for generating 8000 kilowatts. The cost is estimated at $500,000.

SAN DIEGO, CAL.—The San Diego Consolidated Gas & Electric Company has filed with the Board of Supervisors an application for a franchise to lay gas mains and pipes and to erect poles and wires for transmitting electricity along any and all public highways in San Diego county, outside the limits of incorporated municipalities. Sealed bids for such a franchise will be received up to Nov. 5th.

AJO, ARIZ.—Southern Sierras Power Company will construct an electric power transmission line from Yuma to the mines of the New Cornelia Copper Company here, a distance of 160 miles. The contract calls for the delivery of 2000 kilowatts of electrical energy to the company. The Sierras company recently completed the construction of its power transmission line from El Centro, Cal., to Yuma, Ariz.

LOS ANGELES, CAL.—United Light & Power Company will start work in 30 days on a dam at the mouth of Prairie Fork, in upper San Gabriel Canyon, and on the building of two power plants. The dam will be of concrete of the Eastwood type and 200 feet high, 500 feet at the top and 100 feet at the bottom. The first power plant will have a power drop of 1248 feet and will develop 8000 horsepower. A power sluice will lead from the first plant to the second power house, a distance of six miles. This will have a drop of 1818 feet and will develop 14,000 horsepower. By the construction of 7.7 miles of transmission line it will be possible to connect with any important electric company of Southern California. The cost of the project is figured at $2,000,000. G. O. Newman is chief engineer.

THE INTER-MOUNTAIN DISTRICT

MALTA, MONT.—Contract for an electric lighting system has been let to George W. Kemper, Minot, North Dakota, for $39,900.

HAILEY, IDA.—Chas. Peter, president of the Mascot & Terra Mining Company, will install next year an electric light and power plant.

SILVER CITY, IDA.—It is reported that the Idaho Power Company plans the immediate extension of its transmission lines to Deming.

HAILEY, IDA.—Election will probably be called November 15th on the proposed $90,000 bond issue for construction of power and water system.

OATMAN, ARIZ.—An electric transmission line will be erected to the gold ore mine in Oatman and complete electrical equipment will be installed.

ANACONDA, MONT.—Mountain States Telephone & Telegraph Company contemplates the improving of the lighting system. Cost is estimated at $35,000.

SALT LAKE CITY, UTAH.—The Salt Lake & Utah Railroad Company, it is reported contemplates the construction of an extension from Salt Lake City to Eureka.

BUTTE, MONT.—City Electrician Roberts suggests a complete reorganization of the city lighting system. He advocates changes of lamps at a cost of $6500 and giving 47,000 candle power more light.

BUHL, IDA.—The Idaho Power Company starts a power line to Jarbidge which will go south from Thousand Springs plant. It will require 1378 poles, 178,157 pounds of guy wires and $17,000 worth of insulators.

PLEVNA, MONT.—Stater Brothers of Baker, Montana, have been consulting with the business men of the city on the question of establishing an electric light and power plant here, and have asked for a franchise.

POPLAR, MONT.—M. A. Erickson of Lamoure, North Dakota, will install the new light plant. He has purchased the old plant. It will be a steam plant with a 100 h.p. Corlis engine. The present system will be changed to an alternating current.

GREAT FALLS, MONT.—Electrical Service Company recently opened for business here. The new company solicits only repair work along electrical lines and is catering particularly to the automobile trade. C. A. Luckett and E. W. Kimberk are partners in the firm.

TROY, MONT.—The Kootenai Light & Power Company, it is reported, has entered into a contract with the Snowstorm Mining Company by which the latter will furnish electricity for lamps and motors in Troy under a franchise granted by the Council last June. Work will begin on the installation at once.

BUTTE, MONT.—Montana Power Company is rapidly developing into the most important industrial corporation of Montana. With the completion of the Holter hydroelectric plant, 30 miles north of Helena, the company has added another large unit to its power facilities. Construction has been completed but generation of power will not begin until November 1.

DES MOINES, IDA.—The new 13,000-volt line to Des Moines is progressing rapidly. A third wire was strung in on the existing 13,000-volt, single phase line, from Quarry to one and one-quarter miles west of Tukwilla. From this point the existing 2200-volt, Sunnydale-Three Tree Point line was reconstructed and overbuilt with 13,000-volt, three-phase, for a distance of two miles.

DENVER, COLO.—The Colorado Power Company reports that an aggregate of 5,347 horsepower was involved in twenty-three contracts representing new business. The estimated annual revenue to be produced by the business exceeds $180,000,—about 16 per cent of the company's present annual gross operating revenue. All contracts will become effective during or before next January.

SALT LAKE CITY, UTAH.—Electrification of the Denver & Rio Grande between Salt Lake City and Helper will be undertaken soon after the merging of the road with the Missouri Pacific and the Western Pacific.

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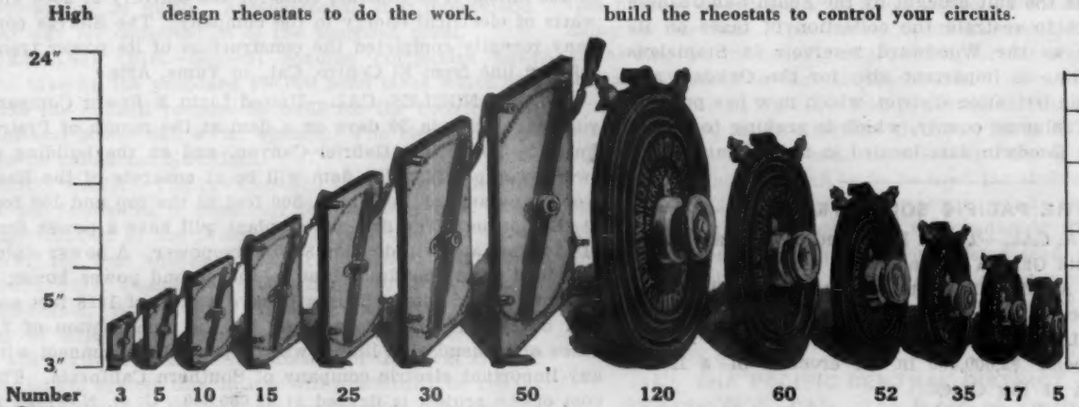

Ward Leonard Electric Company

Mount Vernon, New York